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as a semi-permeable membrane....

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EVOLUTION WITHOUT MUTATIONS

There's a tendency to hold that the process of evolution depends on the accumulation of favorable mutations, one of those concepts that is the truth and nothing but the truth—but not all the truth. It's the missing part of the truth in that idea that causes a major part of the human problem of racism and race hatred.

The difficulties arise from two simultaneously true, and mutually exclusive facts—which, of course, constitutes an "inconsistent statement" in terms of the One-Eyed Logician. Logic, formal or scholastic logic, is inherently incompetent to handle two simultaneous dissimilar truths. In the problem of genetics, we have a situation which contains two simultaneous and dissimilar truths. Therefore the problem has no logical reality, no logical discussion is possible, and no logical solution can be obtained.

That doesn't mean that a non-logical but *rational* solution cannot be obtained. But to do it, the facts,

whether pleasant and desirable, or angrily frustrating and obnoxious, must be gathered, faced, and acknowledged. You can't solve problems by denying facts, and if a problem cannot be solved by logic, that fact, too, must be faced.

What's injustice? I don't know, but I can suggest one type of injustice: "The effort to impose a solution by a technique appropriate to one level of abstraction on a problem inherently belonging to a different level of abstraction is unjust."

Examples: If two mathematicians are arguing about the solution to a mathematical problem, and mathematician A seeks to solve the problem by use of a club, that is unjust. A logical-level problem cannot be justly solved by action.

If a man is starving, and some logician seeks to convince him by cogent argument that starvation doesn't exist, or isn't important, that's unjust. The imposition of a logic-level solution on an action-level problem is precisely as unjust

as the imposition of an action-level technique on a logical-mathematical problem.

Equally, logic can't justly be used in solving an emotional problem. But that, of course, is something that our whole culture insists on doing, so that isn't recognized as injustice! It is loudly stated that using emotional-level techniques to handle a logical problem is unjust; it certainly is. Trouble is, the converse—using logic as necessary-and-sufficient technique for solving emotional problems—is equally unjust. Logic is necessary; certainly. But it isn't sufficient.

Facts are necessary, too—but facts-without-meanings are not sufficient, either.

Evolution is a process involving action-facts, logical-relationships, and emotional-meanings. The latter system involves the logically-impossible patterns produced by simultaneous nonidentical facts—and, to date, we have no discipline of thinking competent to handle it, and therefore no discipline of thinking competent to solve the problem. The best we can do is lay out the facts of the problem to be studied.

An individual produced by the bisexual reproduction method of the mammals is, simultaneously, two different and mutually exclusive things: he is a unique—completely unique—genetic entity. And at the same time he is a statistical "one." As an individual, he can have two children, or three, or four—but as a statistical "one," he will have 2.78

children. He will do both of these two things simultaneously; he will, simultaneously, be a unique individual having three children, and be a statistical-one who has 2.78 children. Both statements will be true of him at the same time; with respect to his genetic effect on the race, *both statements must be considered simultaneously.*

I know that is logically impossible. I agree fully. But this is, unfortunately, a case of "you has to can." If you want to solve the problem, you *have* to do it, whether you can or not!

And, obviously, logic is incompetent, hopelessly and absolutely incompetent, to do so. So we can throw out right now any logical arguments about genetics and race; if they're logical, they are inherently unjust!

Let's look into it further, and the reasons will become clearer.

Genetics, from the long-term viewpoint of evolution, is a purely statistical process. The pressures of the environment apply selective forces that tend to skew the curve of normal distribution, and this constant pressure on the curve of distribution will tend to move the norm in one direction, by elimination of the lower end of the curve.

Consider a group of ten thousand children of ten-years age. If we plot their height on a standard statistical graph, we'll get the old familiar bell-shaped curve. Let's march them
(Continued on page 158)



RIBBON IN THE SKY

There are times when xenophobia makes a lot of good sense—and times when it doesn't. But it took the Med Service man to spot that — and cure the psychic disorder with a physical attack!

BY MURRAY LEINSTER

Illustrated by van Dongen



I

"An error is a denial of reality, but mistakes are mere mental malfunctionings. In an emergency, a mistake may be made because of the need for precipitate action. There is no time to choose the best course; something must be done at once. Most mistakes, however, are made

without any such exterior pressure. One accepts the first imagined solution to a problem without examining it, either out of an urgent desire to avoid the labor of thinking, or out of impassioned reluctance to think about the matter at hand when pricier and more pleasurable other things can be contemplated . . ."

The Practice of Thinking
Fitzgerald

It turned out afterward that somebody had punched the wrong button on a computer. It was in a matter in which mistakes are not permissible, but just as nothing can be manufactured without an ordinary hammer figuring somewhere in the making or the making-ready-to-make, so nothing can be done without a fallible human operating at some stage of the proceedings. And humans make mistakes casually, oddhandedly, with impartial lack of malice, and unpredictability. So . . .

Calhoun heard the tape-speaker say, "*When the gong sounds, breakout will follow in five seconds.*" Then it made solemn ticking noises while Calhoun yawned and put aside the book, "*The Practice of Thinking*," that he'd been studying. Study was a necessity in his profession. Besides, it helped to pass the time in overdrive. He went to the control-desk chair and strapped in. Murgatroyd the *torped* uncoiled his tail from about his nose and stood up from where he was catching twenty winks. He padded to the place under Calhoun's chair where there were things to grab hold of, if necessary, with four black paws and a prehensile tail.

"*Chee*," said Murgatroyd conversationally in his shrill treble.

"I agree," Calhoun told him gravely. "Stone walls do not a prison make, nor Med Ship hulls a cage. But it will be good to get outside for a change."

The tape-speaker ticked and ticked and ticked and ticked. There was

the sound of a gong. A voice said measuredly, "*Five—four—three—two—one—*"

The ship came out of overdrive. Calhoun winced and swallowed. Nobody ever gets used to going into overdrive or coming out of it. One is hideously dizzy for an instant, and his stomach has a brief but violent urge to upchuck, and no matter how often one has experienced it, it is necessary to fight a flash of irrational panic caused by the two sensations together.

But after an instant Calhoun stared about him as the vision-screens came to life. They showed the cosmos outside the Med Ship. It was a perfectly normal cosmos—not at all the cosmos of overdrive—but it looked extremely wrong to Calhoun. He and Murgatroyd and the Med Ship were in emptiness. There were stars on every hand, and they were of every conceivable color and degree of brightness. But every one of them was a point of light, and a point only.

This, obviously, was not what he'd expected. These days ships do not stop to view the universe from the monstrous loneliness which is Between-the-Stars. All ships go into overdrive as near their port of departure as they can. Usually it is something like five or six planetary diameters out from the local spaceport. All ships come out of overdrive as near their destinations as computation makes possible. They do not stop to look at scenery on the way. It isn't good for humans

to look at stars when there are only stars to see. The sight has a tendency to make them feel small. Too small. Men have been known to come out of such an experience gibbering.

Calhoun scowled at the sight of Between-the-Stars. This was not good. But he wasn't frightened—not yet. There should have been a flaming sun somewhere nearby, and there should have been bright crescents or half-disks or mottled cloudy planets swimming within view. The sun should have been the star Merida, and Calhoun should land in commonplace fashion on Merida II and make a routine planetary health check on a settled, complacent population, and presently he should head back to Med Headquarters with a report containing absolutely nothing of importance. But he couldn't do any of these things. He was in purely empty space. It was appalling.

Murgatroyd jumped up to the arm of the control-chair, to gaze wisely at the screens. Calhoun continued to scowl. Murgatroyd imitated him with a *terminal's* fine complacency in duplicating a man's actions. What he saw meant nothing to him, of course. But he was moved to comment.

"Chee," he said shrilly.

"To be sure," agreed Calhoun distastefully. "That is a very sage observation, Murgatroyd. But I deplore the situation that calls for it. Somebody's bilged on us."

Murgatroyd liked to think that he

was carrying on a conversation. He said zestfully:

"Chee-chee! Chee-chee-chee!"

"No doubt," conceded Calhoun. "But this is a mess! Hop down and let me try to get out of it."

Murgatroyd disappointedly hopped to the floor. He watched with bright eyes as Calhoun annoyedly went to the emergency-equipment locker and brought out the apparatus designed to take care of a state of things like this. If the situation wasn't too bad, correcting it should be simple enough. If it was too bad, it could be fatal.

The average separation of stars throughout the galaxy, of course, is something like four or five light-years. The distance between sol-type stars is on an average very much higher, and with certain specific exceptions habitable planets are satellites of sol-type suns. But only a fraction of the habitable planets are colonized, and when a ship has traveled blind, in overdrive, for two months or more its pilot cannot simply look astern and recognize his point of departure. There's too much scenery in between. Further, nobody can locate himself by the use of star-maps unless he knows where something on the star-map is, with reference to himself. Which makes a star-map not always useful.

But the present blunder might not be serious. If the Med Ship had come out into normal space no more than eight to ten light-years from Merida, Calhoun might identify that sun by producing parallax. He

could detect relative distances for a much greater range. But it was to be hoped that his present blunder was small.

He got out the camera with its six lenses for the six vision-screens which showed space in all directions. He clamped it in place and painstakingly snapped a plate. In seconds he had everything above third magnitude faithfully recorded in its own color, and with relative brightnesses expressed in the size of the dots of tint. He put the plate aside and said:

"Overdrive coming, Murgatroyd."

He pressed the short-hop button and there was dizziness and nausea and a flash of fear—all three sensations momentary. Murgatroyd said, "*Chee*" in a protesting tone, but Calhoun held down the button for an accurate five minutes. He and Murgatroyd gulped together when he let up the button again and all space whirled and nausea hit as before. He took another plate of all the heavens, made into one by the six-lensed camera. He swung the ship by ninety degrees and pressed the short-hop button a second time. More dizziness and panic and digestive revolt. In five minutes it was repeated as the ship came out to normal space yet again.

"*Chee-chee!*" protested Murgatroyd. His furry paws held his round little belly against further insult.

"I agree," said Calhoun. "I don't like it either. But I want to know where we are—if anywhere."

He set up the comparator and in-

serted the three plates. Each had images of each of the six vision-screens. When the instrument whirled, each of the plates in turn was visible for part of a second. Extremely remote stars would not jiggle perceptibly—would not show parallax—but anything within twenty light-years should. The jiggling distance could be increased by taking the plates still farther apart. This time, though, there was one star which visibly wavered in the comparator. Calhoun regarded it suspiciously.

"We're Heaven knows where," he said dourly. "Somebody really messed us up! The only star that shows parallax isn't Merida. In fact, I don't believe in it at all! Two plates show it as a sol-class sun and the third says it's a red dwarf!"

On the face of it, such a thing was impossible. A sun cannot be one color as seen from one spot, and another color seen from another. Especially when the shift of angle is small.

Calhoun made rough computations. He hand-set the overdrive for something over an hour's run in the direction of the one star-image which wobbled and thereby beckoned. He threw the switch. He gulped, and Murgatroyd acted for a moment as if he intended to yield unreservedly to the nausea of entering overdrive. But he refrained.

There was nothing to do but kill time for an hour. There was a micro-reel of starplates, showing the heav-

ens as photographed with the same galactic co-ordinates from every visited sol-class star in this sector of the galaxy. Fewer than one in forty had a colonized planet, but if the nearest had been visited before, and if the heavens had been photographed there, by matching the stars to the appropriate plate he could find out where he was. Then a star-map might begin to be of some use to him. But he had still to determine whether the error was in his astrogation unit, or in the data fed to it. If the first, he'd be very bad off indeed. If the second, he could still be in a fix. But there was no point in worrying while in overdrive. He lay down on his bunk and tried to concentrate again on the book he'd laid aside.

"Human error, moreover," he read, "*is never purely random. The mind tends to regard stored data as infallible and to disregard new data which contradicts it . . .*" He yawned, and skipped. ". . . *So each person has a personal factor of error which is not only quantitative but qualitative . . .*"

He read on and on, only half absorbing what he read. But a man who has reached the status of a Med Ship man in the Interstellar Medical Service hasn't finished learning. He's still away down the ladder of rank. He has plenty of studying ahead of him before he gets very far.

The tape speaker said, "*When the gong sounds, breakout will be five seconds off.*" It began to tick-

tock, slowly and deliberately. Calhoun got into the control seat and strapped in. Murgatroyd said peevishly, "*Chee!*" and went to position underneath the chair. The voice said, "*Five—four—three—two—one—*"

The little Med Ship came out of overdrive, and instantly its emergency rockets kicked violently and Murgatroyd held desperately, fast. Then the rockets went off. There'd been something unguessable nearby—perhaps cometary debris at the extremest outer limit of a highly eccentric orbit. Now there was a starfield and a sun within two light-hours. But if Calhoun had stared, earlier, when there was no sun in sight at all, now he gazed blankly at the spectacle before him.

There was a sun off to starboard. It was a yellow sun—a sol-type star with a barely perceptible disk. There were planets. Calhoun saw immediately one gas-giant near enough to be more than a point, and a sliver of light which was the crescent of another more nearly in line toward the sun. But he gazed at a belt, a band, a ribbon of shining stuff which was starkly out of all reason.

It was a thin curtain of luminosity circling this yellow star. It was not a ring from the breakup of a satellite within Roche's Limit. There were two quite solid planets inside it and nearer to the star. It was a thin, wide, luminous golden ribbon which looked like something that needed a flatiron to smooth it out. It looked something like an incan-

descent smoke ring. It was not smooth. It had lumps in it. There were corrugations in it. An unimaginable rocket with a flat exhaust could have made it while chasing its tail around the sun. But that couldn't have happened, either.

Calhoun stared for seconds.

"Now," he said, "I've seen everything!" Then he grunted as realization came. "And we're all right, Murgatroyd! It's not our computers that went wrong. Somebody fed them wrong data. We arrived where we aimed for, and there'll be a colonized planet somewhere around."

He unlimbered the electron telescope and began a search. But he couldn't resist a closer look at the ribbon in space. It had exactly the structure of a slightly wobbly wrinkled ribbon without beginning or end. It had to be a complex of solid particles, of course, and an organization of solid particles cannot exist in space without orbital motion. But orbits would smooth out in the course of thousands of revolutions around a primary. This was not smoothed out. It was relatively new.

"It's sodium dust," said Calhoun appreciatively. "Or maybe potassium. Hung out there on purpose. Particles small enough to have terrific surface and reflective power, and big enough not to be pushed out of orbit by light-pressure. Clever, Murgatroyd! At a guess it'll have been put out to take care of the climate on a planet just inside it. Which would be—there! Let's go look!"

He was so absorbed in his admiration that the almost momentary overdrive-hop needed for approach went nearly unnoticed. He even realized—his appreciation increasing—that this cloud of tiny particles accounted for the red-dwarf appearance on one of the plates he'd taken. Light passing through widely dispersed and very small particles turns red. From one position, he'd photographed through this dust cloud.

The ribbon was a magnificent idea—the more magnificent because of its simplicity. It would reflect back otherwise wasted sun-heat to a too-cold planet and make it warmer. There was probably only an infinitesimal actual mass of powder in the ring, at that. Tens or scores of tons in all. Hardly more.

The planet for which it had been established was the third world out. As is usual with sol-class systems, the third planet's distance from the sun was about a hundred* twenty million miles. It had icecaps covering more than two-thirds of its surface. The sprawling white fingers of glaciation marked mountain chains and highlands nearly to the equator. But there was some blue sea, and there was green vegetation in a narrow belt of tropicity.

Calhoun jockeyed the Med Ship to position for a landing call. This was not Merida II, but there should be a colony here. That glowing ribbon had not been hung out for nothing.

"Med Ship Esclipsus Twenty," he said confidently into the spacephone

make. "Calling ground. Requesting co-ordinates for landing. My mass is fifty tons. Repeat, five-oh tons. Purpose of landing, to find out where I am and how to get where I belong."

There was a clicking. Calhoun repeated the call. He heard murmurings which were not directed into the transmitter on the planet. He heard an agitated, "*How long once a ship landed?*" Another voice was saying fiercely, "*Even if he doesn't come from Two City or Three City, who knows what sickness—*" There was sudden silence, as if a hand had been clapped over the microphone below. Then a long pause. Calhoun made the standard call for the third time.

"*Med Ship Eulipus Twenty,*" said the spacephone speaker grudgingly. "*You will be allowed to land. Take position—*" Calhoun blinked at the instructions he received. The co-ordinates were not the normal galactic ones. They gave the local time at the spaceport, and the planetary latitude. He was to place himself overhead. He could do it, of course, but the instructions were unthinkable. Galactic co-ordinates had been used ever since Calhoun knew anything about such matters. But he acknowledged the instructions. Then the voice from the speaker said truculently: "*Don't hurry! We might change our minds! And we have to figure settings for an only fifty-ton ship, anyhow.*"

Calhoun's mouth dropped open. A Med Ship was welcome every-

where, these days. The Interstellar Medical Service was one of those overworked, understaffed, kicked-around organizations which is everywhere taken for granted. Like breathable air, nobody thought to be grateful for it—but nobody was suspicious of it, either.

The suspicion and the weird co-ordinates and the ribbon in space combined to give Calhoun a highly improbable suspicion. He looked forward with great interest to this landing. He had not been ordered to land here, but he suspected that a Med Ship landing was a long, long time overdue.

"I forgot to take star-pictures," he told Murgatroyd, "but a ribbon like this would have been talked about if it had been reported before. I doubt star-pictures would do us any good. The odds are our only chance to find out where we are is to ask." Then he shrugged his shoulders. "Anyhow this won't be routine!"

"Obey!" agreed Murgatroyd, profoundly.

II

"An unsolvable but urgent problem may produce in a society, as in an individual, an uncontrollable emotional tantrum, an emotional denial of the problem's existence, or purposive research for a solution. In older days, the first reaction produced mass-tantrums then called 'wars.' The second produced fanatically dogmatic ideologies. The third produced modern civilization. All three reactions still appear in individuals. If

the first two should return to societies, as such . . ."

The Practice of Thinking
Fitzgerald

The descent, at least, was not routine. It was nerve-racking. The force-field from the planet's giant steel landing grid reached out into space and fumbled for the Med Ship. That was clumsily done. When it found the ship, it locked on. And that was awkwardly handled. The rest was worse. Whoever handled the controls, aground, was hopelessly inept. Once the Med Ship's hull-temperature began to climb, and Calhoun had to throw on the space-phone and yelp for caution. He did not see as much of the nearing planet as he'd have liked.

At fifty miles of height, the last trace of blue sea vanished around the bulge of the world. At twenty miles, the mountain chains were clearly visible, with their tortured, winding ice rivers which were glaciers. At this height three patches of green were visible from aloft. One, directly below, was little more than a mile in diameter and the landing grid was its center and almost its circumference. Another was streaky and long, and there seemed to be heavy mist boiling about it and above it. The third was roughly triangular. They were many miles apart. Two of them vanished behind mountains as the ship descended.

There were no cities in view. There were no highways. This was an ice world with bare ground and

open water at its equator only. The spaceport was placed in a snow-ringed polar valley.

Near landing, Calhoun strapped in because of the awkwardness with which the ship was lowered. He took Murgatroyd on his lap. The small craft bounced and wobbled as unskilled hands let it down. Presently, Calhoun saw the angular girders of the landing grid's latticed top rise past the opened ports. Seconds later, the Med Ship bumped and slid and bounced heart-stoppingly. Then it struck ground with a violent jolt.

Calhoun got his breath back as the little ship creaked and adjusted itself to rest on its landing fins after some months in space.

"Now," said the voice in the spacephone speaker—but it sounded as if it were trying to conceal relief—"now stay in your ship. Our weapons are bearing on you. You may not come out until we've decided what to do about you."

Calhoun raised his eyebrows. This was very unusual indeed. He glanced at the external field indicator. The landing grid field was off. So the operator bluffed. In case of need Calhoun could blast off on emergency rockets and probably escape close-range weapons anyhow—if there were any—and he could certainly get around the bulge of the world before the amateur at the grid's controls could hook on to him again.

"Take your time," he said with

irony. "I'll twiddle my fingers. I've nothing better to do!"

He freed himself from his chair and went to a port to see. He regarded the landscape about him with something like unbelief.

The landing grid itself was a full mile across and half as high. It was a vast, circular frame of steel beams reaching heavenward, with the curiously curving copper cables strung as they had to be to create the highly special force-field which made space transportation practical. Normally such gigantic structures rose in the centers of spaceport cities. They drew upon the planet's icono-

sphere for power to lift and land cargo ships from the stars, and between-times they supplied energy for manufactures and the operation of cities. They were built, necessarily, upon stable bedrock formations, and for convenience were usually located where the cargoes to be shipped would require least surface transportation.

But here there was no city. There was perhaps a thousand acres of greenness—a mere vague rim around the outside of the grid. There was a control-room building to one side, of course. It was solidly built of stone, but there had been an agglomeration of lean-tos added to it



with slanting walls and roofs of thin stratified rock. And there were cattle grazing on the green grass. The center of the grid was a pasture!

Save for the clutter about the grid-control building there were no structures, no dwellings, no houses or homes anywhere in view. There was no longer even a highway leading to the grid. Calhoun threw on the outside microphones and there was no sound except a thin keening of wind in the steelwork overhead. But presently one of the cattle made a momental bellowing sound.

Calhoun whistled as he went from one port to another.

"Murgatroyd," he said meditatively on his second round, "you observe—if you observe—one of the consequences of human error. I still don't know where I am, because I doubt that starplates have ever been made from this solar system, and I didn't take one for comparison anyhow. But I can tell you that this planet formerly had a habitability rating of something like oh point oh, meaning that if somebody wanted to live here it would be possible but it wouldn't be sensible. But people did come here, and it was a mistake."

He stared at a human figure, far away. It was a woman, dressed in shapeless, badly draping garments. She moved toward a clump of dark-coated cattle and did something in their midst.

"The mistake looks pretty evident to me," added Calhoun, "and I see some possibilities I don't like at all.

There is such a thing as an isolation syndrome, Murgatroyd. A syndrome is a complex of pathological symptoms which occur together as a result of some morbid condition. To us humans, isolation is morbid. You help me to endure it, Murgatroyd, but I couldn't get along with only your society chattering as it is—for but so long. A group of people can get along longer than a single man, but there is a limit for any small-sized group."

"Chce," said Murgatroyd.

"In fact," said Calhoun, frowning, "there's a specific health problem involved, which the Med Service recognizes. There can be partial immunity, but there can be some tricky variations. If we're up against a really typical case we have a job on hand. And how did these people get that dust-ring out in space? They surely didn't hang it out themselves!"

He sat down and scowled at his thoughts. Presently he rose again and once more surveyed the icy landscape. The curious green pasture about the landing grid was highly improbable. He saw glaciers overhanging this valley. They were giant ice rivers which should continue to flow and overwhelm this relatively sheltered spot. They didn't. Why not?

It was more than an hour before the spacephone clattered. When Calhoun threw the switch again a new voice came out of it. This was

also a male voice, but it was high-pitched as if from tension.

"We've been talking about you," said the voice. It quivered with agitation which was quite out of reason. "You say you're Med Service. All right. Suppose you prove it!"

The landed Med Ship should be proof enough for anybody. But Calhoun said politely:

"I have the regular identifications. If you'll go on vision, I'll show you my credentials."

"Our screen's broken," said the voice, suspiciously, "but we have a sick cow. It was dumped on us night before last. Cure her and we'll accept it as identification."

Calhoun could hardly believe his ears. This was an emergency situation! The curing of a sick cow was considered more convincing than a Med Ship man's regular credentials! Such a scale of values hinted at more than a mere isolation syndrome. There were thousands of inhabited worlds, now, with splendid cities and technologies which most men accepted with the same bland confidence with which they looked for sunrise. The human race was civilized. Suspicion of a Med Ship was unheard of. But here was a world—

"Why . . . certainly," said Calhoun blankly. "I suppose I may go outside to . . . ah . . . visit the patient?"

"We'll drive her up to your ship," said the high, tense voice. "And you stay close to it!" Then it said darkly, "Men from Two City sneaked past our sentries to dump it on

us. They want to wipe out our herd! What kind of weapons have you got?"

"This is a Med Ship!" protested Calhoun. "I've nothing more than I might need in an emergency!"

"We'll want them anyhow," said the voice. "You said you need to find out where you are. We'll tell you, if you've got enough weapons to make it worth while."

Calhoun drew a deep breath.

"We can argue that later," he said. "I'm just a trifle puzzled. But first things first. Drive your cow."

He held his head in his hands. He remembered to throw off the space-phone and said:

"Murgatroyd, say something sensible! I never ran into anybody quite as close to coming apart at the seams as that! Not lately! Say something rational!"

Murgatroyd said, "Chee?" in an inquiring tone.

"Thanks," said Calhoun. "Thanks a lot."

He went back to the ports to watch. He saw men come out of the peculiar agglomeration of buildings that had been piled around the grid's sturdy control building. They were clothed in cloth that was heavy and very stiff, to judge by the way it shifted with its wearers' movements. Calhoun wasn't familiar with it. The men moved stolidly, on foot, across the incredible pasture which had been a landing space for ships of space at some time or other.

They reached a spot where a dark animal form rested on the ground

Calhoun hadn't noticed it particularly. Cattle, he knew, folded their legs and lay down and chewed cud. They existed nearly everywhere that human colonies had been built. On some worlds there were other domestic animals descended from those of Earth. Of course there were edible plants and some wholesome animals which had no connection at all with humanity's remote ancestral home, but from the beginning human beings had been adjusted to symbiosis with the organic life of Earth. Foodstuffs of non-terrestrial origin could supplement Earth-food, of course. In some cases Earth-foods were the supplements and local, non-terrestrial foodstuffs the staples. But human beings did not thrive on a wholly un-Earthly diet.

The clump of slowly moving men reached the reclining cow. They pulled up stakes which surrounded her, and coiled up wire or cordage which had made the stakes into a fence. They prodded the animal. Presently it lushed to its feet and swung its head about foolishly. They drove it toward the Med Ship.

Fifty yards away they stopped, and the outside microphones brought the sound of their voices muttering. By then Calhoun had seen their faces. Four of the six were bearded. The other two were young men. On most worlds men prided themselves that they needed to shave, but few of them omitted the practice.

These six moved hastily away, though the two younger ones turned often to look back. The cow, de-

serted, stumbled to a reclining position. It lay down, staring stupidly about. It rested its head on the ground.

"I go out now, eh?" asked Calhoun mildly.

"We're watching you!" grated the spacephone speaker.

Calhoun glanced at the outside temperature indicator and added a garment. He put a blaster in his pocket. He went out the exit port.

The air was bitter cold, after two months in a heat-metered ship, but Calhoun did not feel cold. It took him seconds to understand why. It was that the ground was warm. Radiant heat kept him comfortable, though the air was icy. Heat elements underground must draw power from somewhere—the grid's tapping of the ionosphere—and heated this pasture from underneath so forage plants could grow here. They did. The cattle fed on them. There would be hydroponic gardens somewhere else, probably underground. They would supply vegetable food in greater quantity. But in the nature of things human beings had to have animal food in a cold climate.

Calhoun went across the pasture with the frowning snowy mountains all about. He regarded the reclining beast with an almost humorous attention. He did not know anything about the special diseases of domestic animals. He had only the knowledge required of a Med Ship man. But that should be adequate. The tense voice had said that this beast

had been "dumped," to "wipe out" the local herd. So there would be infection and there would be some infective agent.

He painstakingly took samples of blood and saliva. In a ruminant, certainly, any digestive-tract infection should show up in the saliva. He reflected that he did not know the normal bovine temperature, so he couldn't check it. Nor the respiration. But the Inter-stellar Medical Service was not often called on to treat ailing cows.

Back in the ship he diluted his samples and put droplets in the usual nutrient solutions. He sealed up droplets in those tiny slides which allow a culture to be examined as it grows. His microscope, of course, allowed of inspection under light of any wave length desired, and so yielded information by the frequency of the light which gave clearest images of different features of microorganisms.

After five minutes of inspection he grunted and hauled out his antibiotic stores. He added infinitesimal traces of cillin to the culture-media. In the microscope, he watched the active microscopic creatures die. He checked with the other samples.

He went out to the listless, enfeebled animal. He made a wry guess at its body weight. He used the injector. He went back to the Med Ship. He called on the space-phone.

"I think," he said politely, "that your beast will be all right in thirty

hours or so. Now, how about telling me the name of this ven?"

The voice said sharply:

"There's a matter of weapons, too! Wait till we see how the cow does! Sunset will come in an hour. When day comes again, if the cow is better—we'll see!"

There was a click. The space-phone cut off.

Calhoun pulled out the log-make. There was already an audio record of all ship-operations and communications. Now he added comments—a description of the ribbon in the sky, the appearance of the planet, and such conclusions as he'd come to. He ended:

"... The samples from the cow were full of a single coccus, which seemed to have no resistance to standard antibiotics. I pumped the beast full of cillin and called it a day. I'm concerned, though, because of the clear signs of an isolation syndrome here. They're idiotically suspicious of me and won't even promise a bargain, as if I could somehow overreach them because I'm a stranger. They've sentries out—they said somebody sneaked past them—against what I imagine must be Two City and Three City. I've an impression that the sentries are to enforce a quarantine rather than to put up a fight. It is probable that the other communities practice the same tactics—plus biological cold war if somebody did bring a sick cow here to infect and destroy the local herd. These people may have

a landing grid, but they've an isolation syndrome and I'm afraid there's a classic Crusoe health problem in being. If that's so, it's going to be nasty!"

He cut off the log. The classic Crusoe problem would be extremely awkward if he'd run into it. There was a legend about an individual back on old Earth who'd been left isolated on an island by shipwreck for half a lifetime. His name was given to the public-health difficulties which occurred when accidental isolations occurred during the chaotic first centuries of galactic migration. There was one shipwreck to which the name was first applied. The ship was missing, and the descendants of the crew and passengers were not contacted until three generations had passed. Larger-scale and worse cases occurred later, when colonies were established by entrepreneurs who grew rich in the establishment of the new settlements, and had no interest in maintaining them. Such events could hardly happen now, of course, but even a Crusoe condition was still possible in theory. It might exist here. Calhoun hoped not.

It did not occur to him that the affair was not his business because he hadn't been assigned to it. He belonged to the Med Service, and the physical well-being of humans everywhere was the concern of that service. If people lived by choice in an inhospitable environment, that was not a Med man's problem, but anything which led to preventable deaths was. And in a Crusoe colony

there were plenty of preventable deaths!

He cooked a meal to have something to occupy his mind. Murgatroyd sat on his haunches and sniffed blissfully. Presently Calhoun ate, and again presently darkness fell on this part of the world. There were new noises—small ones. He went to look. The pasture inside the landing grid was faintly lighted by the glowing ribbon in the sky. It looked like a many-times-brighter Milky Way. The girders of the landing grid looked very black against it.

He saw a dark figure plodding away until he vanished. Then he reappeared as a deeper black against the snow beyond the pasture. He went on and on until he disappeared again. A long time later another figure appeared where he'd gone out of sight. It plodded back toward the grid. It was a different individual. Calhoun had watched a changing of sentries. Suspicion. Hostility. The least attractive qualities of the human race, brought out by isolation.

There could not be a large population here, since such suspicions existed. And it was divided into—most likely—three again-isolated communities. This one had the landing grid, which meant power, and a spacephone but no vision screen attached to it. The fact that there were hostile separate communities made the situation much more difficult, from a medical point of view. It multiplied the possible ghastly features which could exist.

Murgatroyd ate until his furry

belly was round as a ball, and settled to stuffed slumber with his tail curled around his nose. Calhoun tried to read. But he was restless. His own time-cycle on the ship did not in the least agree with the time of daylight on this planet. He was wakeful when there was utter quiet outside. Once one of the cattle made a dismal lowing noise. Twice or three times he heard cracking sounds, like sharp detonations, from the mountains. They would be stirrings in the glaciers.

He tried to study, but painstaking analysis of the methods by which human brains defeated their own ends and came up with wrong answers was not appealing. He grew horribly restless.

It had been dark for hours when he heard rustling noises on the ground outside—through the microphones, of course. He turned up the amplification and made sure that a small party of men moved toward the Med Ship. From time to time they paused, as if in caution.

"Murgatroyd," he said dryly, "we're going to have visitors. They didn't give notice by sparephone, so they're unauthorized."

Murgatroyd blinked awake. He watched as Calhoun made sure of the blaster in his pocket and turned on the log-mike. He said:

"All set, Murgatroyd?"

Murgatroyd said "*Chee*" in his small shrill voice just as a soft and urgent knock sounded on the exit-lock door. It was made with bare

knuckles. Calhoun grimaced and went into the lock. He undogged the door and began to open it, when it was whipped from his grasp and plunging figures pushed in. They swept him back into the Med Ship's cabin. He heard the lock-door close softly. Then he faced five roughly, heavily clothed men who wore cloaks and mittens and hoods, with cloth stretched tightly across their faces below the eyes. He saw knives, but no blasters.

A stocky figure with cold gray eyes appeared as spokesman.

"You're the man who got landed today," he said in a deep voice and with an effect of earnestness. "My name's Hunt. Two City. You're a Med Ship man?"

"That's right," said Calhoun. The eyes upon him were more scared than threatening—all but the stocky man named Hunt. "I landed to find out where I was," he added. "The data-card for my astrogator had been punched wrong. What—"

"You know about sickness, eh?" demanded the stocky man evenly. "How to cure it and stop it?"

"I'm a Med Ship man," admitted Calhoun. "For whatever that may mean."

"You're needed in Two City," said the deep-voiced Hunt. His manner was purest resolution. "We came to get you. Get y'medicines. Dress warm. Load us down, if you like, with what you want to take. We got a sledge waiting."

Calhoun felt a momentary relief. This might make his job vastly eas-

ier. When isolation and fear brings a freezing of the mind against any novelty—even hope—a medical man has his troubles. But if one community welcomed him—

"Cheer!" said Murgatroyd indignantly from overhead. Calhoun glanced up and Murgatroyd glared from a paw-hold near the ceiling. He was a peaceable animal. When there was scuffling he got out of the way. But now he chattered angrily. The masked men looked at him fearfully. But their deep-voiced leader growled at them.

"Just a animal." He swung back to Calhoun. "We got a need for you," he repeated. "We mean all right, and anything we got you can have if you want it. But you're coming with us?"

"Are your good intentions," asked Calhoun, "proved by your wearing masks?"

"They're to keep from catchin' your sickness," said the deep voice impatiently. "Point to what you want us to take!"

Calhoun's feeling of encouragement vanished. He winced a little. The isolation syndrome was fully developed. It was a matter of faith that strange's were dangerous. All men were assumed to carry contagion. Once, they'd have been believed to carry bad luck. But a regained primitiveness would still retain some trace of the culture from which it had fallen. If there were three settlements, as the pastures-lands seen from space suggested, they would not believe in magic, but

they would believe in contagion. They might have, or once have had, good reason. Anyhow they would fanatically refrain from contact with any but their own fellow-citizens. Yet there would always be troubles to excite their terrors. In groups of more than a very few there would always be an impulse against the isolation which seemed the only possible safety in a hostile world. The effectiveness of the counter-instinct would depend in part on communications, but the urge to exogamy can produce ghastly results in a small culture gone fanatic.

"I think," said Calhoun, "that I'd better come with you. But the people here have to know I've gone. I wouldn't like them to heave my ship out to space in pure panic because I didn't answer from inside it!"

"Leave a writing," said Hunt's deep voice, as impatiently as before. "I'll write it. Make them boil, but they don't dare follow us!"

"No?"

"Think One City men," asked the stocky man scornfully, "will risk us toppling avalanches on them?"

Calhoun saw. Arid mountain-country in a polar zone, travel would be difficult at best. These intruders had risked much to come here for him. But they were proud of their daring. They did not believe that the folk of lesser cities—tribes—groups than theirs had courage like theirs. Calhoun recognized it as a part of that complex of symptoms

which can begin with an epidemic and end with group-madness.

"I'll want this—and this—and that," said Calhoun. He wouldn't risk his microscope. Antibiotics might be useful. Antiseptics, definitely. His med-kit— "That's all."

"Your blankets," said Hunt. "Y'want them, too."

Calhoun shrugged. He clothed himself for the cold outside. He had a blaster in his pocket, but he casually and openly took down a blast-rifle. His captors offered no objection. He shrugged again and replaced it. Starting to take it was only a test. He made a guess that this stocky leader, Hunt, might have kept his community just a little more nearly sane than the group that had set him to the care of a sick cow. He hoped so.

"Murgatroyd," he said to the *normal* still clinging up near the control-room's top, "we have a professional call to make. You'd better come along. In fact, you must."

Murgatroyd came suspiciously down, and then leaped to Calhoun's shoulder. He clung there, gazing distrustfully about. Calhoun realized that his captors—callers—whatever they were—stayed huddled away from every object in the cabin. They fingered nothing. But the scared eyes of most of them proved that it was not honesty which moved them to such meticulousness. It was fear. Of contagion.

"They're uncouth, eh?" said Calhoun sardonically. "But think, Mur-

gatroyd, they may have hearts of gold! We physicians have to pretend to think so, in any case!"

"Côrr!" said Murgatroyd resentfully as Calhoun moved toward the lock.

III

"Civilization is based upon rational thought applied to the purposes of men. Most mistakes occur in the process of thinking. But there can be a deep and fundamental error about purposes. It is simply a fact that the purposes of human beings are not merely those of rational animals. It is the profoundest of errors to believe otherwise—to consider, for example, that prosperity, or pleasure, or even survival, cannot be priced so high that their purchase is a mistake."

The Practice of Thinking
Fitzgerald

There was a sheet of paper fastened outside the combination lock of the Med Ship's exit port. It said that Calhoun had been taken away by men of Two City, to tend some sick person. It said that he would be returned. The latter part might not be believed, but the Med Ship might not be destroyed. The colony of the landing grid might try to break into it, but success was unlikely.

Meanwhile, it was an odd feeling to cross the grassy pastureland with hoarfrost crunching underfoot. The grid's steel girders made a harsh lace of blackness against the sky, with its shining ribbon slashing across it. But Calhoun found himself reflecting that the underground heat ap-



plied to the thousand-acre pasture had been regulated with discretion. There was surely power enough available from the grid to turn the area into a place of tropic warmth, in which only lush and thick-leaved vegetation could thrive. But a storm from the frigid mountains would destroy such plots. Hardy, low-growing, semi-arctic grass was the only suitable ground-cover. The iciest of winds could not freeze it so long as the ground was warmed.

Tonight's wind was biting. Calhoun had donned a parka of synthetic fur on which frost would not congeal at any temperature, but he was forced to draw fur before his face and adjust heated goggles be-

fore his eyes would stop watering. Yet in the three-quarter-mile trudge to the edge of the snow, his feet became almost uncomfortably warm.

That, though, ended where a sledge waited at the edge of the snow. Five men had forced themselves inside the Med Ship. A sixth was on guard beside the sledge. There had been no alarm. Now the stocky man, Hunt, urged him to a seat upon the sledge.

"I'm reasonably able-bodied," said Calhoun mildly.

"You don't know where we're going—or how," growled Hunt.

Calhoun got on the sledge. The runners were extraordinarily long. He could not see small details, but

it appeared that the sledge had been made of extreme length to bridge crevasses in a glacier. There were long thin metal tubes to help. At the same time, it looked as if it could be made flexible to twist and turn in a narrow or obstacle-strewn path.

The six clumsily-clad men pushed it a long way, while Calhoun frowned at riding. Then Murgatroyd shivered, and Calhoun thrust him inside the parka. There Murgatroyd wriggled until his nose went up past Calhoun's chin and he could sniff the outside air. From time to time he withdrew his nose—perhaps with frost-crystals on it. But always he poked his small black snout to sniff again. His whiskers tickled.

Two miles from the pastureland, the sledge stopped. One man fumbled somewhere behind Calhoun's seat and a roaring noise began. All six piled upon the long, slender snow-vehicle. It began to move. A man swore. Then, suddenly, the sledge darted forward and went gliding up a steep incline. It gathered speed. Twin arcs of disturbed snow rose up on either side, like bow-waves from a speeding water-skimmer. The sledge darted into a great ravine of purest white and the roaring sound was multiplied by echoes.

For better than half an hour, then, Calhoun experienced a ride which for thrills and beauty and hair-raising suspense made mere space-travel the stodgiest of transportation. Once the sledge shot out from beehiving cliffs—all icy and glittering in

the light from the sky—and hurtled down a slope of snow so swiftly that the wind literally whistled about the bodies of its occupants. Then the drive roared more loudly, and there was heavy deceleration, and abruptly the sledge barely crawled. The flexibility of the thing came into operation. Four of the crew, each controlling one segment of the vehicle, caused it to twist and writhe over the surface of a glacier, where pressure-ridges abounded and pinnacles of shattered, squeezed-up ice were not uncommon.

Once they stopped short and slender rods reached out and touched, and the sledge slid delicately over them and was itself a bridge across a crevasse in the ice that went down unguessably. Then it went on and the rods were retrieved. Minutes later the sledge-motor was roaring loudly, but it barely crawled up to what appeared to be a mountain creit—there were ranges of mountains extending beyond seeing in the weird blue-and-golden skylight and then there was a breathtaking dash and a plunge into what was incredibly a natural tunnel beside the course of an ice-river—and abruptly there was a vast valley below.

This was their destination. Some thousands of feet down in the very valley-bottom there was a strange, two-mile-long patch of darkness. The blue-gold light showed no color there, but it was actually an artificially warmed pastureland like that within and about the landing grid. But from this dark patch vapors

ascended, and rolled, and gathered to form a misty roof—which was swept away and torn to tatters by an unseen wind.

The sledge slowed and stopped beside a precipitous upcrop of stone while still high above the valley bottom. A voice called sharply:

"It's us," growled Hunt's deep voice. "We got him. Everything all right?"

... "No!" rasped the invisible voice. "They broke out—he broke out and got her loose, and they run off again. We shoulda killed 'em and had done with it!"

Everything stopped. The men on the sledge seemed to become still in the shock of pure disaster, pure frustration. Calhoun waited. Hunt was motionless. Then one of the men on the sledge spat elaborately. Then another stirred.

"Had your work for nothing," rasped the voice from the shadow. "The trouble that's started goes for nothing, too!"

Calhoun asked crisply:

"What's this? My special patients ran away?"

"That the Med man we heard about?" The invisible speaker was almost derisive with anger. "Sure! They've run off, all right! Man and girl together. After we made trouble with Three City by not killin' 'em and One City by sneakin' over to get you! Three City men'll come boiling over—" The voice raised in pitch, expressing scorn and fury. "Because they fell in love! We shoulda killed 'em right off or let

'em die in the snow like they wanted in the first place!"

Calhoun nodded almost imperceptibly to himself. When there is a syndrome forbidding association between societies, it is a part of the society's interior struggle against morbidity that there shall be forbidden romances. The practice of exogamy is necessary for racial health, hence there is an instinct for it. The more sternly a small population restricts its human contacts to its own members, the more repressed the exogamic impulse becomes. It is never consciously recognized for what it is. But especially when repressed, other-than-customary contacts trigger it explosively. The romantic appeal of a stranger is at once a wise provision of nature and a cause of incredible furies and disasters. It is notorious that spaceship crews are inordinately popular where colonies are small and strangers infrequent. It is no less notorious that a girl may be destitute of suitors on her own world, but has nearly her choice of husbands if she merely saves the ship fare to another.

Calhoun could have predicted defiance of tradition and law and quarantine alike, as soon as he began to learn the state of things here. The frenzied rage produced by this specific case was normal. Some young girl must have loved terribly, and some young man been no less impassioned, to accept expulsion from society on a world where there was no food except in hydroponic

gardens and artificially warmed pastures. It was no less than suicide for those who loved. It was no less than a cause for battle among those who did not.

The deep-voiced Hunt said now, in leaden, heavy tones:

"Cap it. This is my doing. It was my daughter I did it for. I wanted to keep her from dying. I'll pay for trying. They'll be satisfied in Three City and in One alike if you tell 'em it's my fault and I've been drove out for trouble-making."

Calhoun said sharply:

"What's that? What's going on now?"

The man in the shadows answered—by his tone as much to express disgust as to give information.

"His daughter Nym was on sentry-duty against Three City sneaks. They had a sentry against us. The two of 'em talked across the valley between 'em. They had walkers to report with. They used 'em to talk. Presently she sneaked a vision screen out of store. He prob'ly did, too. So presently they figured it was worth dyin' to die together. They run off for the hotlands. No chance to make it, o'course!"

The hotlands could hardly be anything but the warm equatorial belt of the planet.

"We should've let them go on and die," said the stocky Hunt, dearly, "but I persuaded men to help me bring 'em back. We were careful against sickness! And we . . . I . . . locked them separate and

I . . . I hoped my daughter mightn't die of the Three City sickness. I even hoped that young man wouldn't die of the sickness they say we have that we don't notice and they die of. Then we heard your call to One City. We couldn't answer it, but we heard all you said, even to the bargain about the cow. And . . . we'd heard of Med men who cured sickness. I . . . hoped you could save Nym from dying of the Three City sickness or passing it in our city. My friends risked much to bring you here. But . . . my daughter and the man have fled again."

"And nobody's goin' to risk any more!" rasped the voice from the shadow of the cliff. "We held a council! It's decided! They're gone and we got to burn out the places they was in! No more! You don't head the Council any more, either! We decided that, too. And no Med man! The Council ruled it!"

Calhoun nodded yet again. It is a part of fear, elaborately to ignore everything that can be denied about the thing feared. Which includes rational measures against it. This was a symptom of the state of things which constituted a Med Service emergency, because it caused needless deaths.

Hunt made a gesture which was at once commanding and filled with despair.

"I'll take the Med man back so One City can use him if they dare, and not blame you for me taking him. I'll have to take the sledge—but he's used it so it'd have to be

burned anyhow. You men be sure to burn your clothes. Three City'll be satisfied because I'm lost to balance for their man lost. The Med man will tell One City I'm drove out. You've lost me and my daughter too, and Three City's lost a man. One City'll growl and threaten, but they win by this. They won't risk a showdown."

Silence again. As if reluctantly, one man of the party that had abducted Calhoun moved away from the sledge and toward the abysmally deep shadow of the cliff. Hunt said harshly:

"Don't forget to burn your clothes! You others, get off the sledge. I'm taking the Med man back and there's no need for a war because I made the mistake and I'm paying for it."

The remaining men of the kidnapping-party stepped off the sledge into the trampled snow, just here. One said clumsily:

"Sorry, Hunt. Luck!"

"What luck could I have?" asked the stocky man, wearily.

The roaring of the sledge's drive, which had been a mere muffled throbbing, rose to a booming bellow. The snow-vehicle surged forward, heading downward into the valley with the dark area below. Half a mile down, it began to sweep in a great circle to return upon its former track. Calhoun twisted in his seat and shouted above the roar. He made violent gestures. The deep-voiced Hunt, driving from a stand-

ing position behind the seat, slowed the sledge. It came nearly to a stop and hissing noises from snow passing beneath it could be heard.

"What's the matter?" His tone was lifeless. "What d'you want?"

"Two people have run away," said Calhoun vexedly. "Your daughter Nym and a man from Three City—whatever that is. You're driven out to prevent fighting between the cities."

"Yes," said Hunt, without expression.

"Then let's go get the runaways," said Calhoun irritably, "before they die in the snow! After all, you got me to have me save them! And there's no need to anybody to die unless they have to!"

Hunt said without any expression at all:

"They're heading for the hotlands—where they'd never get. It's my meaning to take you back to your ship, and then find them and give them the sledge so's they'll . . . so Nym will keep on living a while longer."

He moved to shift the controls and set the sledge again in motion. His state of mind was familiar enough to Calhoun—shock or despair so great that he could feel no other emotion. He would not react to argument. He could not weigh it. He'd made a despairing conclusion and he was lost to all thought beyond carrying it out. His intention was not simply a violent reaction to a single event, such as an elopement. He intended desperate means by

which a complex situation could be kept from becoming a catastrophe to others. Three City had to be dealt with in this fashion, and One City in that, and it was requisite that he die, himself. Not only for his daughter but for his community. He had resolved to go to his death for good and sufficient reasons. To get his attention to anything else, he would have to be shocked into something other than despair.

Calhoun brought his hand out of its pocket. He held a blaster. He'd pocketed the weapon before he went to examine the cow. He'd had the power to stop his own abduction at any instant. But a medical man does not refuse a call for professional service.

Now he pointed the blaster to one side and pressed the stud. A half-acre of snow burst into steam. It bellowed upward and went withering away in the peculiar blue-gold glow of this world at night.

"I don't want to be taken back to my ship," said Calhoun firmly. "I want to catch those runaways and do whatever's necessary so they won't die at all. The situation here has been thrown into my lap. It's a Med Service obligation to intervene in problems of public health, and there's surely a public-health problem here!"

Murgatroyd wriggled vigorously under Calhoun's parka. He'd heard the spitting of the blaster and the roaring of exploded steam. He was disturbed. The stocky man stared.

"What's that?" he demanded blankly. "You pick up—"

"We're going to pick up your daughter and the man she's with," Calhoun told him crossly. "There's an isolation syndrome and what looks like a Crusoe problem here! It's got to be dealt with! As a matter of public health!"

The stocky Hunt started at him. Calhoun's intentions were unimaginable to him. He floundered among incredible ideas.

"We medics," said Calhoun, "made it necessary for men to invent interplanetary travel because we kept people from dying and the population on old Earth got too large. Then we made interstellar travel necessary because we continued to keep people from dying and one solar system wasn't big enough. We're responsible for nine-tenths of civilization as it exists today, because we produced the conditions that make civilization necessary! And since on this planet civilization is going downhill and people are dying without necessity, I have the plain obligation to stop it! So let's go pick up your daughter Nym and this sweetheart of hers, and keep them from dying and get civilization on the upgrade again!"

The former leader of the kidnappers said hoarsely:

"You mean—" Then he stammered. "Th-th-they're heading for the hotlands. No other way to go. Watch for their tracks!"

The drive-engine bellowed. The

sledge raced ahead. And now it did not complete the circle that had been begun, to head back to the landing grid. Now it straightened and rushed in a splendid roaring fierceness down between the sides of the valley. It left behind the dark patch with its whirling mists. It flung aside bow-waves of fine snow, which made rainbows in the half-light which was darkness here. It rushed and rushed and rushed, leaving behind a depression which was a singular permanent proof of its passage.

Calhoun cringed a little against the wind. He could see little or nothing of what was ahead. The sprayed wings of upflung snow prevented it. Hunt, standing erect, could do better. Murgatroyd, inside the parka, again wriggled his nose out into the stinging wind and withdrew it precipitately.

Hunt drove as if confident of where to go. Calhoun dourly began to fit things into the standard pattern of how such things went. There were self-evidently three cities or colonies on this planet. They'd been named and he'd seen three patches of pasture from the stratosphere. One was plainly warmed by power applied underground—electric power from the landing grid's output. The one now falling behind was less likely to be electrically heated. Steam seemed more probable because of the vapor-veil above it. This sledge was surely fuel-powered. At a guess, a ram-jet drove it. Such motors were simple enough to make,

once the principle of air inflow at low speeds was known. Two City—somewhere to the rear—might operate on a fuel technology which could be based on fossil oil or gas. The power-source for Three City could not now be guessed.

Calhoun scowled as he tried to fill in the picture. His factual data was still limited. There was the misty golden ribbon in space. It was assuredly beyond the technical capacity of cities suffering from an isolation syndrome. He'd guessed at hydroponic gardens underground. There was surely no surface city near the landing grid, and the city entrance they'd just left was in the face of a cliff. Such items pointed to a limited technical capacity. Both, also, suggested mining as the original purpose of the human colony or colonies here.

Only mining would make a colony self-supporting in an arctic climate. This world could have been colonized to secure rare metals from it. There could be a pipeline from an oil field or from a gas well field near a landing grid. Local technological use of gas or oil to process ores might produce ingots of rare metal worth interstellar freight charges. One could even guess that metal reduced by heat-chemistry could be transported in oil suspension over terrain and under conditions when other forms of surface transportation were impractical.

If the colony began as a unit of that sort, it would require only very occasional visits of spacecraft to

carry away its products. It could be a company-planet, colonized and maintained by a single interstellar corporation. It could have been established a hundred and fifty or two hundred years before, when the interstellar service organizations were in their infancy and only operated where they were asked to serve. Such a colony might not even be on record in the Medical Service files:

And that would account for everything. When for some reason the mines became unprofitable, this colony would not be maintained. The people who wished to leave would be taken off—of course. But some would elect to stay behind in the warmed, familiar cities they and their fathers had been born in. They couldn't imagine moving to a strange and unfamiliar world.

So much was normal reasoning. Now the strictly technical logic of the Med Service took over to explain the current state of things. In one century or less an isolated community could lose, absolutely, its defenses against diseases to which it was never exposed. Amerinds were without defense against smallpox, back on Earth. A brown race scattered among thousands of tiny islands was nearly wiped out by measles when it was introduced. Any contact between a long-isolated community and another—perhaps itself long-isolated—would bring out violently any kind of contagion that might exist in either.

There was the mechanism of car-

riers. The real frequency of disease-carriers in the human race had been established less than two generations ago. A very small, isolated population could easily contain a carrier or carriers of some infection. They could spread it so freely that every member of their group acquired immunity during infancy. But a different isolated group might contain a carrier of a different infection and be immune but distributive of it.

It was literally true that each of the three cities might have developed in their first century of isolation a separate immunity to one disease and a separate defenselessness against all others. A member of one community might be actually deadly to a member of either of the others whom he met face to face.

With icy wind blowing upon him as the sledge rushed on, Calhoun wryly realized that all this was wholly familiar. It was taught, nowadays, that something of the sort had caused the ancient, primitive human belief that women were perilous to men, and a man must exercise great precaution to avoid evil *wawa* emanating from his prospective bride. When wives were acquired by capture and all human communities were small and fiercely self-isolated—why each unsanitary tribal group might easily acquire a condition like that assumed in cities One, Two, and Three. The primitive suspicion of woman would have its basis in reality if the women of one tribe possessed immunity to some deadly microbe their skin or garments har-

bored—and if their successful abductors had no defense against it.

The speeding sledge swerved. It leaned inward against the turn. It swerved again, throwing monstrous sheets of snow aloft. Then the drive-jet lessened its roar. The shimmering bow-waves ceased. The sledge slowed to a mere headlong glide.

"Their trail!" Hunt cried in Calhoun's ear.

Calhoun saw depressions in the snow. There were two sets of pear-shaped dents in the otherwise virgin surface. Two man beings, wearing oblong frames on their feet, criss-crossed with cordage to support them atop the snow, had trudged ahead, here, through the gold-blue night.

Calhoun knew exactly what had happened. He could make the modifications the local situation imposed upon a standard pattern, and reconstitute a complete experience leading up to now.

A girl in heavy, clumsy garments had mounted guard in a Two City sentry-post above a snow-filled mountain valley. There were long and bitter-cold hours of watching, in which nothing whatever happened. Eternal snows seemed eternally the same, and there was little in life but monotony. But she'd known that across the valley there was another lonely watcher from an alien city, the touch of whose hand or even whose breath would mean sickness and death. She'd have mused upon the strangeness that protected her in this loneliness—

because her touch or her breath would be contagion upon him, too. She'd have begun by feeling a vague dread of the other sentry. But presently, perhaps, there came a furtive call on the walkie-frequency used by sentries for communication with their own cities.

Very probably she did not answer at first. But she might listen. And she would hear a young man's voice, filled with curiosity about the sentry who watched as he did.

There'd come a day when she'd answer shyly. And there would be relief and a certain fascination in talking to someone so much like herself—but so alien and so deadly! Of course there could be no harm in talking to someone who would flee from actual face-to-face contact as desperately as herself. They might come to joke about their mutual dangerousness. They might find it amusing that cities which dared not meet should hate. Then there'd come a vast curiosity to see each other. They'd discuss that frankly—because what possible evil could come, if two persons were deadly to each other should they actually approach?

Then there'd come a time when they looked at each other breathlessly in vision screens they'd secretly stolen from their separate cities' stores. There could be no harm. They were only curious! But she would see someone at once infinitely strange but utterly dear, and he would see someone lovely beyond the girls of his own city. Then they would regret the alienness which

made them perilous to each other. Then they would resent it fiercely. They'd end by denying it.

So across the wide valley of eternal snow there would travel whispers of desperate rebellion, and then firmly resolute murmurings, and then what seemed the most obvious of truths—that it would be much more satisfactory to die together than to live apart. And insane plannings would follow — arrangements by which two trembling young folk would meet secretly and flee. Toward the hotlands, to be sure, but without any belief that the days before death, while they were together, were more precious than the lifetimes they would give up to secure them.

Calhoun could see all this very clearly, and he assured himself that he regarded it with ironic detachment. He asserted in his own mind

that it was merely the manifestation of that blind impulse to exogamy which makes spacemen romantic in far spaceports and invests an outer-planet girl with glamour. But it was something more. It was also that strange and unreasonable and solely human trait which causes one to rejoice selflessly that someone else exists, so that his or her own life and happiness is put into its place of proper insignificance in the cosmos. It may begin in instinct, but it becomes an achievement only humans can encompass.

Hunt knew it—the stocky, deep-voiced despairing figure who stared hungrily for the daughter who had dehed him and for whom he was an exile from all food and warmth.

He flung out a mittened hand.

"There!" he cried joyously. "It's them!"



There was a dark speck in the blow-gold night-glow. As the sledge swept close, there were two small figures who stood close together. They defiantly faced the approaching sledge. As its drive-motor stopped and it merely glided on, its runners whispering on the snow, the girl snatched away the cold-mask which all the inhabitants of this planet wore out-of-doors. She raised her face to the man. They kissed.

And then the young man desperately raised a knife. It glittered in the light of the ribbon in the sky. And—

Calhoun's blaster made its inadequate rasping noise. The knife-blade turned incandescent for two-thirds of its length. The young man dropped the suddenly searing handle. The knife sank hissing into the snow.

"It's always thrilling to be dramatic," said Calhoun severely, "but I assure you it's much more satisfying to be sane. The young lady's name is Nym, I believe. I do not know the gentleman. But Nym's father and myself have come to put the technical resources of two civilizations at your disposal as a first step toward treatment of the pandemic isolation syndrome on this planet, which with the complications that have developed amounts to a Crusoe health problem."

Murgatroyd tried feverishly to get his head out of Calhoun's parka past his chin. He'd heard a blaster. He sensed excitement. His nose

emerged, whiffing frantically. Calhoun pushed it back.

"Tell them, Hunt," he said irritably. "Tell them what we're here for and what you've done already!"

The girl's father told her unsteadily—almost humbly, for some reason—that the jet-sledge had come to take her and her sweetheart—to be her husband—to the hotlands where at least they would not die of cold. Calhoun added crossly that he believed there would even be food there—because of the ribbon in the sky.

Trembling and abashed, the fugitives got on the sledge. Its motor roared. It surged toward the hotlands under the golden glow of that ribbon—which obviously had no rational explanation unless somebody had made a grave mistake. But Calhoun had not.

IV

"An action is normally the result of a thought. Since we cannot retract an action, we tend to feel that we cannot retract the thought which produced it. In effect, we cling desperately to our mistakes. In order to change our views we have commonly to be forced to act upon new thoughts, so urgent and so necessary that without downing our former, mistaken ideas, we can abandon them tactfully without saying anything to anybody—even ourselves."

The Practice of Thinking

Fitzgerald

Murgatroyd came down a tree with his cheek-pouches bulged with nuts. Calhoun inserted a finger, and

Murgatroyd readily permitted him to remove and examine the results of his scramble aloft. Calhoun grunted. Murgatroyd did have other and more useful abilities in the service of public health, but right here and now his delicate digestion was extremely convenient. His stomach worked so much like a human's, that anything Murgatroyd ate was safe for Calhoun to an incredible degree of probability. And Murgatroyd ate nothing that disagreed with him.

"Instead of 'physician, heal thyself,'" Calhoun observed, "it's amounted to 'physician, feed thyself' since we got past the frost-line, Murgatroyd. I am gratified."

"*Chee!*" said Murgatroyd complacently.

"I expected," said Calhoun, "only to benefit by the charm of your society in what I thought would be a routine check-trip to Merida Two. Instead, some unknown fumble-finger punched a wrong button and we wound up here. Not exactly here, but near enough. I brought you from the Med Ship because there was nobody to stay around and feed you, and now you feed us—at least by pointing out edible things we might otherwise miss."

"*Chee!*" said Murgatroyd. He strutted.

"I wish," protested Calhoun annoyedly, "that you wouldn't imitate that Pat character from Three City! As a brand-new husband he's entitled to strut a little, but I object to your imitating him! You haven't anybody acting like Nym!—gazing

at you raply as if you'd invented not only marriage but romance itself, impassioned falsehoods, and all other desirable things back to night and morning!"

Murgatroyd said, "*Chee?*" and turned to face away from Calhoun.

The two of them, just then, stood on a leaf-covered patch of ground which slanted down to the singularly smooth and reflective water of a tiny bay. Behind and above them reared gigantic mountains. There was snow in blinding-white sheets overhead, but the snowline itself was safely three thousand feet above them. Beyond the bay was a wide estuary, with more mountains behind it, with more snowfields on their flanks. A series of leaping cascades jumped downward from somewhere aloft where a glacier-foot melted in the sun's heat. And everywhere that snow was not, green stuff shone in the sunlight.

Nym's father, Hunt, came hurriedly toward the pair. He'd abandoned the thick felt cloak and heavy boots of Two City. Now he was dressed nearly like a civilized man, but he carried a sharpened stick in one hand and in the other a string of authentic fish. He wore an expression of astonishment. It was becoming habitual.

"Murgatroyd," said Calhoun casually, "has found another kind of edible nut. Terrestrial, too, like half the living things we've seen. Only the stuff crowding the glaciers seems to be native. The rest originated on

Earth and was brought here, some time or another."

Hunt nodded. He seemed to find some difficulty in speaking.

"I've been talking to Pat," he said at last.

"The son-in-law," observed Calhoun, "who has to thank you not only for your daughter and his life, but for your public career in Two City which qualified you to perform a marriage ceremony. I hope he was respectful."

Hunt made an impatient gesture.

"He says," he protested, "that you haven't done anything either to Nym or to him to keep them from dying!"

Calhoun nodded.

"That's true."

"But . . . they should die! Nym should die of the Three City sickness! And Three City people have always said that we had a sickness too . . . that did not harm us but they died of!"

"Which," agreed Calhoun, "is undoubtedly historical fact. Its current value is that of one factor in an isolation syndrome and consequently a complicating factor in the Crusoe health problem here. I've let Nym and Pat go untreated to prove it. I think there's only a sort of mass hypochondria based on strictly accurate tradition. Which would be normal."

Hunt shook his head.

"I don't understand!" he protested helplessly.

"Someday I'll draw a diagram,"

Calhoun told him. "It is complicated.

Did you check with Pat on what Three City knows about the ribbon in the sky? I suspect it accounts for the terrestrial plants and animals here, indirectly. There wouldn't be an accidental planting of edible nuts and fish and squirrels and pigeons and rabbits and bumblebees! I suspect there was a mistake somewhere. What does Pat say?"

Hunt shrugged his shoulders.

"When I talk to him," added Calhoun, "he doesn't pay attention. He simply gazes at Nym and beams. The man's mad! But you're his father-in-law. He has to be polite to you!"

Hunt sat down abruptly. He rested his spear against a tree and looked over his string of fish. He wasn't used to the abundance of foodstuffs here, and the temperature—Calhoun estimated it at fifty degrees—seemed to him incredibly balmy. Now he thoughtfully separated one fish from the rest and with a certain new skill began to slice away two neatly boneless filets. Calhoun had showed him the trick the day after a lesson in fish-spearing, which was two days after their arrival.

"Children in Three City," growled Hunt, "are taught the same as in Two City. Men came to this planet to work the mines. There was a company which sent them, and every so often it sent ships to take what the mines yielded, and to bring things the people wanted. Men lived well and happily. The company hung

the ribbon in the sky so the hotlands could grow food for the men. But presently the mines could not deliver what they made to the ships when they came. The hotlands grew bigger, the glaciers flowed faster, and the pipes between the cities were broken and could not be kept repaired. So the company said that since the mine-products could no longer be had, it could not send the ships. Those who wanted to move to other worlds would be carried there. Some men went, with their wives and children. But the grandfathers of our fathers' grandfathers were contented here. They had homes and heat and food. They would not go."

Hunt regarded the pinkish brook trout fillet he'd just separated. He bit off a mouthful and chewed, thoughtfully.

"That really tastes better cooked," said Calhoun mildly.

"But it is good this way also," said Hunt. He was grizzled and stocky and somehow possessed of dignity which was not to be lost merely by eating raw fish. He waved the remainder of the fillet. "Then the ships ceased to come. Then sickness came. One City had a sickness it gave to people of Two and Three when they visited it. Two City had a sickness it gave to One and Three. Three City—" He granted. "Our children in Two say only Two City people have no sickness. Three City children are taught that only Three City is clean of sickness."

Calhoun said nothing. Murga-

troyd tried to gnaw open one of the nuts he'd brought down from the tree. Calhoun took it and another and struck them together. Both cracked. He gave them to Murgatroyd, who ate them with great satisfaction.

Hunt looked up suddenly.

"Pat did not give a Three City sickness to Nym," he observed, "so our thinking was wrong. And Nym has not given a Two City sickness to him. His thinking was wrong."

Calhoun said meditatively:

"It's tricky. But sickness can be kept by a carrier, just as you people have believed of other cities. A carrier has a sickness but does not know it. People around the carrier have the sickness on their bodies or their clothing from the carrier. They distribute it. Soon everybody in the city where there is a carrier—" Calhoun had a moment's qualm because he used the word "city." But to Hunt the idea conveyed was a bare few hundred people. "Soon everybody is used to the sickness. They are immune. They cannot know it. But somebody from another city can come, and they are not used to the sickness, and they become ill and die."

Hunt considered shrewdly.

"Because the sickness is on clothing? From the carrier?"

Calhoun nodded.

"Different carriers have different sicknesses. So one carrier in One City might have one disease, and all the people in One City became used

to it while they were babies—became immune. There could be another carrier with another sickness in Two City. A third in Three City. In each city they were used to their own sickness—”

“That is it,” said Hunt, nodding. “But why is Pat not dying? Or Nym? Why do you do nothing to keep them alive?”

“Suppose,” said Calhoun, “the carrier of a sickness dies. What happens?”

Hunt bit again, and chewed. Suddenly he choked. He sputtered:

“There is no sickness to spread on the clothing! The people no longer have it to give to strangers who are not used to it! The babies do not get used to it while they are little! There is no longer a One City sickness or a Two City sickness or a Three!”

“There is,” said Calhoun, “only a profound belief in them. You had it. Everybody else still has it. And the cities are isolated and put out sentries because they believe in what used to be true. And people like Nym and Pat run away in the snow and die of it. There is much death because of it. You would have died of it.”

Hunt chewed and swallowed. Then he grinned.

“Now what?” His deep voice was quaintly respectful to Calhoun, so much younger than himself. “I like this! We were not fools to believe, because it was true. But we are fools if we still believe, because it is not true any more. How do we

make people understand, Calhoun? You tell me. I can handle people when they are not afraid. I can make them do what I think wise—when they are not afraid. But when they fear—”

“When they fear,” said Calhoun dryly, “they want a stranger to tell them what to do. You came for me, remember? You are a stranger to One City and Three City. Pat is a stranger to Two City. If the cities become really afraid—”

Hunt grunted. He watched Calhoun intently. And Calhoun was peculiarly reminded of the elected president of a highly cultured planet, who had exactly that completely intent way of looking at one.

“Go on!” said Hunt. “How frighten them into—this?”

He waved his hand about. Calhoun, his tone very dry indeed, told him. Words would not be enough. Threats would not be enough. Promises would not be enough. But rabbits and pigeons and squirrels and fish—fish that were frozen like other human food—and piles of edible nuts. . . . They would not be enough either, by themselves. But—

“An isolation syndrome is a neurotic condition, and a Crusoe problem amounts to neurotic hypochondria. You can do it—you and Pat.”

Hunt grimaced.

“I hate the cold, now. But I will do it. After all, if I am to have grandchildren there should be other children for them to play with! And

we will take you back to your ship?"

"You will," said Calhoun. "By the way, what is the name of this planet, anyhow?"

Hunt told him.

* * *

Calhoun slipped across the pasture inside the landing grid and examined the ship from the outside. There had been batterings, but the door had not been opened. In the light of the ribbon in the sky he could see, too, that the ground was trampled down but only at a respectful distance. One City was disturbed about the Med Ship. But it did not know what to do. So long as nothing happened from it . . .

He was working the combination lock-door when something hopped, low-down and near him. He jumped, and Margatroyd said, "*Chee?*" Then Calhoun realized what had startled him. He finished the unlocking of the port. He went in and closed the port behind him. The air inside seemed curiously dead, after so long a time outside. He flipped on the outside microphones and heard tiny patterings. He heard mildly resentful cooings. He grinned.

When morning came, the people of One City would find their pasture-land inhabited by small snowshoe rabbits and small and bush-tailed squirrels and fluttering pigeons. They would react as Two City and Three City had already done—with panic. And panic would inevitably call up the notion of the most-feared thing

in their lives. Sickness. The most-feared thing is always a rare thing, of course. One cannot fear a frequent thing, because one either dies of it or comes to take it for granted. Fear is always of the rare or nonexistent. One City would be filled with fear of sickness.

And sickness would come. Hunt would call them, presently, on a walkie-talkie communicator. He would express deep concern because—so he'd say—new domestic animals intended for Two City had been dumped on One City pasture-land. He'd add that they were highly infective, and Two City was already inescapably doomed to an epidemic which would begin with severe headaches, and would continue with cramps and extreme nervous agitation. And he would say that Calhoun had left medicines at Two City with which that sickness and all others could be cured, and if the sickness described should appear in One City—why its victims could be cured if they traveled to Two City.

The sickness would appear. Inevitably. There was no longer sickness in the three communities. Arctic colonies, never visited by people from reservoirs of infection, become magnificently healthy by the operation of purely natural causes. But an isolation syndrome . . .

The people of One City would presently travel, groaning, to Two City. Their suffering would be real. They would dread the breaking of their isolation. But they'd dread sick-

ness—even sickness they only imagined—still more. And when they reached Two City they would find themselves tended by Three City members, and they would be appalled and terrified. But mambo-jumbo medication by Hunt and Pat—and Nym for the women—would reassure them. A Crusoe condition requires heroic treatment. This was it.

Calhoun cheerfully checked over the equipment of the Med Ship. He'd have to take off on emergency rockets. He'd have to be very, very careful in setting a course back to Headquarters to report before starting out again for Merida II. He didn't want to make any mistakes. Suddenly he began to chuckle.

"Murgatroyd," he said amiably, "it's just occurred to me that the mistakes we make—that we struggle so hard to avoid—are part of the scheme of things."

"*Chee?*" said Murgatroyd inquiringly.

"The company that settled this planet," said Calhoun, grinning, "set up that ribbon out in space as a splendidly conservative investment to save money in freight charges. It was a mistake, because it ruined their mining business and they had to write the whole colony off. They made another mistake by not reporting to Med Service, because now they've abandoned the colony and

would have to get a license to re-occupy—which they'd never be granted against the population already there. Somebody made a mistake that brought us here, and One City made a mistake by not accepting us as guests, and Two City made a mistake by sending Nym on sentry duty, and Three City made a mistake . . ."

Murgatroyd yawned.

"You," said Calhoun severely, "make a mistake in not paying attention." He strapped himself in. He stabbed an emergency-rocket control-button. The little ship shot heavenward on a pencil-thin stream of fire. Below him, people of One City would come pouring out of underground to learn what had happened, and they'd find the pasture swarming with friendly squirrels and inquisitive rabbits and cooing pigeons. They'd be scared to death. Calhoun laughed. "I'll spend part of the time in overdrive making a report on it. Since an isolation syndrome is mostly psychological, and a Crusoe condition is wholly so—I managed sound medical treatment by purely psychological means! I'll have fun with that!"

It was a mistake. He got back to Headquarters all right, but when his report was read they made him expand it into a book, with footnotes, an index, and a bibliography.

It was very much of a mistake!

THE END



AMONG THIEVES

The highly civilized tend to demean the crudities of their ancestors, to forget the hard, harsh ways that had to be used to get started. They have it soft, and frown on hardness. . . .

BY POUL ANDERSON

Illustrated by van Dongen

His Excellency M'Katze Unduma, Ambassador of the Terrestrial Federation to the Double Kingdom, was not accustomed to being kept waiting. But as the minutes dragged into an hour, anger faded before a chill deduction.

In this bleakly clock-bound society a short delay was bad manners, even if it were unintentional. But if you kept a man of rank cooling his heels for an entire stony minutes, you offered him an unforgivable insult. Rusch was a barbarian, but he was too canny to humiliate Earth's representative without reason.

Which bore out everything that Terrestrial Intelligence had discovered. From a drunken junior officer, weeping in his cups because Old Earth, Civilization, was going to be attacked and the campus where he had once learned and loved would be scotched to ruin by *his* fire guns—to the battle plans and annotations thereon, which six men had died to smuggle out of the Royal War College—and now, this degradation of the ambassador himself—everything fitted.

The Margrave of Drakenstane had sold out Civilization.

Unduma shuddered, beneath the iridescent cloak, embroidered robe, and ostrich-plume beaddress of his rank. He swept the antechamber with the eyes of a trapped animal.

This castle was ancient, dating back some eight hundred years to the first settlement of Norstad. The grim square massiveness of it, fused stone piled into a barreted mountain, was

not much relieved by modern fittings. Tableservs, loungers, drapes, jewel mosaics, and biomurals only clashed with those fortress walls and ringing flagstones; fluorosheets did not light up all the dark corners, there was perpetual dusk up among the rafters where the old battle banners hung.

A dozen guards were posted around the room, in breastplate and plumed helmet but with very modern blast rifles. They were identical seven-foot blonds, and none of them moved at all, you couldn't even see them breathe. It was an unnerving sight for a Civilized man.

Unduma snubbed out his cigar, swore miserably to himself, and wished he had at least brought along a book.

The inner door opened on noiseless hinges and a shavepate officer emerged. He clicked his heels and bowed at Unduma. "His Lordship will be honored to receive you now, excellency."

The ambassador throttled his anger, nodded, and stood up. He was a tall thin man, the relatively light skin and sharp features of Banta stock predominant in him. Earth's emissaries were normally chosen to approximate a local ideal of beauty—hard to do for some of those weird little cultures scattered through the galaxy—and Norstad-Ostarik had been settled by a rather extreme Caucasoid type which had almost entirely emigrated from the home planet.

The aide showed him through the door and disappeared. Hans von Thoma Rusch, Margrave of Drakenstone, Lawman of the Western Folk-mote, Hereditary Guardian of the White River Gates, et cetera, et cetera, et cetera, sat waiting behind a desk at the end of an enormous black-and-red tile floor. He had a book in his hands, and didn't close it till Unduma, sandals whispering on the great chessboard squares, had come near. Then he stood up and made a short ironic bow.

"How do you do, your excellency," he said. "I am sorry to be so late. Please sit." Such curtness was no apology at all, and both of them knew it.

Unduma lowered himself to a chair in front of the desk. He would *not* show temper, he thought, he was here for a greater purpose. His teeth clamped together.

"Thank you, your lordship," he said tonelessly. "I hope you will have time to talk with me in some detail. I have come on a matter of grave importance."

Rusch's right eyebrow tilted up, so that the archaic monocle he affected beneath it seemed in danger of falling out. He was a big man, stiffly and solidly built, yellow hair cropped to a wiry brush around the long skull, a scar puckering his left cheek. He wore Army uniform, the gray high-collared tunic and old-fashioned breeches and shiny boots of his planet; the trident and suns of a primary general; a sidearm, its handle worn smooth from much use.

If ever the iron barbarian with the iron brain had an epitome, thought Unduma, here he sat!

"Well, your excellency," murmured Rusch—though the harsh Norron language did not lend itself to murmurs—"of course I'll be glad to hear you out. But after all, I've no standing in the Ministry, except as unofficial advisor, and—"

"Please." Unduma lifted a hand. "Must we keep up the fable? You not only speak for all the landed warloads—and the Nor-Samurai are still the most powerful single class in the Double Kingdom—but you have the General Staff in your pouch and, ah, you are well thought of by the royal family. I think I can talk directly to you."

Rusch did not smile, but neither did he trouble to deny what everyone knew, that he was the leader of the fighting aristocracy, friend of the widowed Queen Regent, virtual stepfather of her eight-year-old son King Hjalmar—in a word, that he was the dictator. If he preferred to keep a small title and not have his name unnecessarily before the public, what difference did that make?

"I'll be glad to pass on whatever you wish to say to the proper authorities," he answered slowly. "Pipe." That was an order to his chair, which produced a lit briar for him.

Unduma felt appalled. This series of —informalities— was like one savage blow after another. Till now, in the three hundred-year history of relations between Earth and the

Double Kingdom, the Terrestrial ambassador had ranked everyone but God and the royal family.

No human planet, no matter how long sundered from the main stream, no matter what strange ways it had wandered, failed to remember that Earth was Earth, the home of man and the heart of Civilization. No *desert* planet—had Norstad-Ostrik, then, gone the way of Kolresh?

Biologically, no, thought Unduma with an inward shudder. Nor culturally—yet. But it shrieked at him, from every insolent movement and twist of words, that Rusch had made a political deal.

"Well?" said the Margrave.

Unduma cleared his throat, desperately, and leaned forward. "Your lordship," he said, "my embassy cannot help taking notice of certain public statements, as well as certain military preparations and other matters of common knowledge—"

"And items your spies have dug up," drawled Rusch.

Unduma started. "My lord!"

"My good ambassador," grinned Rusch, "it was you who suggested a straightforward talk. I know Earth has spies here. In any event, it's impossible to hide so large a business as the mobilization of two planets for war."

Unduma felt sweat trickle down his ribs.

"There is . . . you . . . your Ministry has only announced it is a . . . a defense measure," he stammered. "I had hoped . . . frankly, yes, till the last minute I hoped you . . .

your people might see fit to join us against Kolresh."

There was a moment's quiet. So quiet, thought Unduma. A redness crept up Rusch's cheeks, the scar stood livid and his pale eyes were the coldest thing Unduma had ever seen.

Then, slowly, the Margrave got it out through his teeth: "For a number of centuries, your excellency, our people hoped Earth might join them."

"What do you mean?" Unduma forgot all polished inanities. Rusch didn't seem to notice. He stood up and went to the window.

"Come here," he said. "Let me show you something."

The window was a modern inset of clear, invisible plastic, a broad sheet high in the castle's infamous Witch Tower. It looked out on a black sky, the sun was down and the glacial forty-hour darkness of northern Norstad was crawling toward midnight.

Stars glittered mercilessly keen in an emptiness which seemed like crystal, which seemed about to ring thinly in contracting anguish under the cold. Ostrik, the companion planet, stood low to the south, a gibbous moon of steely blue; it never moved in that sky, the two worlds forever faced each other, the windy white peaks of one glaring at the warm lazy seas of the other. Northward, a great curtain of aurora flapped halfway around the cragged horizon.

From this dizzy height, Unduma could see little of the town Drakenstance: a few high-peaked roofs and small glowing windows, lamps lone-some above frozen streets. There wasn't much to see anyhow—no big cities on either planet, only the small towns which had grown from scattered thorps, each clustered humbly about the manor of its lord. Beyond lay winter fields, climbing up the valley walls to the hard green blink of glaciers. It must be blowing out there, he saw snow-devils chase ghostly across the blue-tinged desolation.

Rusch spoke roughly: "Not much of a planet we've got here, is it? Out on the far end of nowhere, a thousand light-years from your precious Earth, and right in the middle of a glacial epoch. Have you ever wondered why we don't set up weather-control stations and give this world a decent climate?"

"Well," began Unduma, "of course, the exigencies of—"

"Of war," Rusch sent his hand upward in a chopping motion, to sweep around the alien constellations. Among them burned Polaris, less than thirty parsecs away, huge and cruelly bright. "We never had a chance. Every time we thought we could begin, there would be war, usually with Kolresh, and the labor and materials would have to go for that. Once, about two centuries back, we did actually get stations established, it was even beginning to warm up a little. Kolresh blasted them off the map.

"Norstad was settled eight hundred years ago. For seven of those centuries, we've had Kolresh at our throats. Do you wonder if we've grown tired?"

"My lord, I . . . I can sympathize," said Unduma awkwardly. "I am not ignorant of your heroic history. But it would seem to me . . . after all, Earth has also fought—"

"At a range of a thousand light-years!" jeered Rusch. "The forgotten war. A few underpaid patrolmen in obsolete rustbucket ships to defend unimportant outposts from sporadic Kolreshite raids. We live on their borders!"

"It would certainly appear, your lordship, that Kolresh is your natural enemy," said Unduma. "As indeed it is of all Civilization, of Homo sapiens himself. What I cannot credit are the, ah, the rumors of an, er, alliance—"

"And why shouldn't we?" snarled Rusch. "For seven hundred years we've held them at bay, while your precious so-called Civilization grew fat behind a wall of our dead young men. The temptation to recoup some of our losses by helping Kolresh conquer Earth is very strong!"

"You don't mean it!" The breath rushed from Unduma's lungs.

The other man's face was like carved bone. "Don't jump to conclusions," he answered. "I merely point out that from our side there's a good deal to be said for such a policy. Now if Earth is prepared to make a different policy worth our while—do you understand?"

Nothing is going to happen in the immediate future. You have time to think about it."

"I would have to . . . communicate with my government," whispered Unduma.

"Of course," said Rusch. His bootheels clacked on the floor as he went back to his desk. "I've had a memorandum prepared for you, an unofficial informal sort of protocol, points which his majesty's government would like to make the basis of negotiations with the Terrestrial Federation. Ah, here!" He picked up a bulky folio. "I suggest you take a leave of absence, your excellency, go home and show your superiors this, ah—"

"Ultimatum," said Unduma in a sick voice.

Rusch shrugged. "Call it what you will." His tone was empty and remote, as if he had already cut himself and his people out of Civilization.

As he accepted the folio, Unduma noticed the book beside it, the one Rusch had been reading: a local edition of Schakspier, badly printed on sleazy paper, but in the original Old Anglic. Odd thing for a barbarian dictator to read. But then, Rusch was a bit of an historical scholar, as well as an enthusiastic kayak racer, meteor polo player, chess champion, mountain climber, and . . . and all-around scoundrel!

Norstad lay in the grip of a ten-thousand-year winter, while Ostarik was a heaven of blue seas breaking

on warm island sands. Nevertheless, because Ostarik harbored a peculiarly nasty plague virus, it remained an unattainable paradise in the sky till a bare two hundred fifty years ago. Then a research team from Earth got to work, found an effective vaccine, and saw a mountain carved into their likeness by the Norron folk.

It was through such means—and the sheer weight of example, the liberty and wealth and happiness of its people—that the Civilization centered on Earth had been propagating itself among colonies isolated for centuries. There were none which lacked reverence for Earth the Mother, Earth the Wise, Earth the Kindly: none but Kolresh, which had long ceased to be human.

Rusch's private speedster whipped him from the icicle walls of Festning Drakenstane to the rose gardens of Sorgenlos in an hour of hell-bat haste across vacuum. But it was several hours more until he and the queen could get away from their courtiers and be alone.

They walked through geometric beds of smoldering blooms, under songbirds and fronded trees, while the copper spires of the little palace reached up to the evening star and the hours-long sunset of Ostarik blazed gold across great quiet waters. The island was no more than a royal retreat, but lately it had known agonies.

Queen Ingra stooped over a mutant rose, tiger striped and a foot across; she plucked the petals from

it and said close to weeping: "But I liked Unduma. I don't want him to hate us."

"He's not a bad sort," agreed Rusch. He stood behind her in a black dress uniform with silver insignia, like a formal version of death.

"He's more than that, Hans. He stands for decency—Norstad froze our souls, and Ostarik hasn't thawed them. I thought Earth might—" Her voice trailed off. She was slender and dark, still young, and her folk came from the rainy dales of Norstad's equator, a farm race with gentler ways than the miners and fishermen and hunters of the red-haired ice ape who had bred Rusch. In her throat, the Norron language softened to a humming music; the Drakenstane men spat their words out rough-edged.

"Earth might what?" Rusch turned a moody gaze to the west. "Lavish more gifts on us? We were always proud of paying our own way."

"Oh, no," said Ingra wearily. "After all, we could trade with them, furs and minerals and so on, if ninety per cent of our production didn't have to go into defense. I only thought they might teach us how to be human."

"I had assumed we were still classified *Homo sapiens*," said Rusch in a parched tone.

"Oh, you know what I mean!" She turned on him, violet eyes suddenly aflame. "Sometimes I wonder if you're human, Margrave Hans von

Thoma Rusch. I mean free, free to be something more than a robot, free to raise children knowing they won't have their lungs shoved out their mouths when a Kolreshite cruiser hulls one of our spaceships. What is our whole culture, Hans? A layer of brutalized farmhands and factory workers—serfs! A top crust of heel-clattering aristocrats who live for nothing but war. A little folk art, folk music, folk saga, full of blood and treachery. Where are our symphonies, novels, cathedrals, research laboratories . . . where are people who can say what they wish and make what they will of their lives and be happy?"

Rusch didn't answer for a moment. He looked at her, unblinking behind his monocle, till she dropped her gaze and twisted her hands together. Then he said only: "You exaggerate."

"Perhaps. It's still the basic truth." Rebellion rode in her voice. "It's what all the other worlds think of us."

"Even if the democratic assumption—that the eternal verities can be discovered by counting enough noses—were true," said Rusch, "you cannot repeal eight hundred years of history by decree."

"No. But you could work toward it," she said. "I think you're wrong in despising the common man, Hans . . . when was he ever given a chance, in this kingdom? We could make a beginning now, and Earth could send psychotechnic advisers,

and in two or three generations—"

"What would Kolresh be doing while we experimented with forms of government?" he laughed.

"Always Kolresh." Her shoulders, slim behind the burning-red cloak, slumped. "Kolresh turned a hundred hopeful towns into radioactive craters and left the gnawed bones of children in the fields. Kolresh killed my husband, like a score of kings before him. Kolresh blasted your family to ash, Hans, and scarred your face and your soul—" She

whirled back on him, fists aloft, and almost screamed: "Do you want to make an ally of Kolresh?"

The Margrave took out his pipe and began filling it. The saffron sun-down, reflected off the ocean to his face, gave him a metal look.

"Well," he said, "we've been at peace with them for all of ten years now. Almost a record."

"Can't we find allies? Real ones? I'm sick of being a figurehead! I'd befrend Ahuramazda, New Mars, Lagrange— We could raise a crusade



against Kolresh, wipe every last filthy one of them out of the universe!"

"Now who's a heel-clattering aristocrat?" grinned Rusch.

He lit his pipe and strolled toward the beach. She stood for an angry moment, then sighed and followed him.

"Do you think it hasn't been tried?" he said patiently. "For generations we've tried to build up a permanent alliance directed at Kolresh. What temporary ones we achieved have always fallen apart. Nobody loves us enough—and, since we've always taken the heaviest blows, nobody hates Kolresh enough."

He found a bench on the glistening edge of the strand, and sat down and looked across a steady march of surf, turned to molten gold by the low sun and the incandescent western clouds. Ingra joined him.

"I can't really blame the others for not liking us," she said in a small voice. "We are overmechanized and undercultured, arrogant, tactless, undemocratic, hard-boiled . . . oh, yes. But their own self-interest—"

"They don't imagine it can happen to them," replied Rusch contemptuously. "And there are even pro-Kolresh elements, here and there." He raised his voice an octave: "Oh, my dear sir, my dear Margrave, what are you saying? Why, of course Kolresh would never attack us! They made a *treaty* never to attack us!"

Ingra sighed, forlornly. Rusch laid

an arm across her shoulders. They sat for a while without speaking.

"Anyway," said the man finally, "Kolresh is too strong for any combination of powers in this part of the galaxy. We and they are the only ones with a military strength worth mentioning. Even Earth would have a hard time defeating them, and Earth, of course, will lean backward before undertaking a major war. She has too much to lose; it's so much more comfortable to regard the Kolreshite raids as mere piracies, the skirmishes as 'police actions.' She just plain will not pay the stiff price of an army and a navy able to whip Kolresh and occupy the Kolreshite planets."

"And so it is to be war again." Ingra looked out in desolation across the sea.

"Maybe not," said Rusch. "Maybe a different kind of war, at least—no more black ships coming out of *our* sky."

He blew smoke for a while, as if gathering courage, then spoke in a quick, impersonal manner: "Look here. We Norrons are not a naval power. It's not in our tradition. Our navy has always been inadequate and always will be. But we can breed the toughest soldiers in the known galaxy, in unlimited numbers; we can condition them into fighting machines, and equip them with the most lethal weapons living flesh can wield.

"Kolresh, of course, is just the opposite. Space nomads, small popu-

lation, able to destroy anything their guns can reach but not able to dig in and hold it against us. For seven hundred years, we and they have been the elephant and the whale. Neither could ever win a real victory over the other; war became the normal state of affairs, peace a breathing spell. Because of the mutation, there will always be war, as long as one single Kolreshite lives. We can't kill them, we can't befriend them—all we can do is be bled white to stop them."

A wind sighed over the slow thunder on the beach. A line of sea birds crossed the sky, thin and black against glowing bronze.

"I know," said Ingra. "I know the history, and I know what you're leading up to. Kolresh will furnish transportation and naval escort; Norstad-Ostarik will furnish men. Between us, we may be able to take Earth."

"We will," said Rusch flatly. "Earth has grown plump and lazy. She can't possibly rearm enough in a few months to stop such a combination."

"And all the galaxy will spit on our name."

"All the galaxy will lie open to conquest, once Earth has fallen."

"How long do you think we would last, riding the Kolresh tiger?"

"I have no illusions about them, my dear. But neither can I see any way to break this eternal deadlock. In a fluid situation, such as the collapse of Earth would produce, we

might be able to create a navy as good as theirs. They've never yet given us a chance to build one, but perhaps—"

"Perhaps not! I doubt very much it was a meteor which wrecked my husband's ship, five years ago. I think Kolresh knew of his hopes, of the shipyard he wanted to start, and murdered him."

"It's probable," said Rusch.

"And you would league us with them." Ingra turned a colorless face on him. "I'm still the queen. I forbid any further consideration of this . . . this obscene alliance!"

Rusch sighed. "I was afraid of that, your highness." For a moment he looked gray, tired. "You have a veto power, of course. But I don't think the Ministry would continue in office a regent who used it against the best interests of—"

She leaped to her feet. "You wouldn't!"

"Oh, you'd not be harmed," said Rusch with a crooked smile. "Not even deposed. You'd be in protective custody, shall we say. Of course, his majesty, your son, would have to be educated elsewhere, but if you wish—"

Her palm cracked on his face. He made no motion.

"I . . . won't veto—" Ingra shook her head. Then her back grew stiff. "Your ship will be ready to take you home, my lord. I do not think we shall require your presence here again."

"As you will, your highness,"

mumbled the dictator of the Double Kingdom.

Though he returned with a bitter word in his mouth, Undama felt the joy, the biological rightness of being home, rise warm within him. He sat on a terrace under the mild sky of Earth, with the dear bright flow of the Zambezi River at his feet and the slim towers of Capital City rearing as far as he could see, each gracious, in its own green park. The people on the clean quiet streets wore airy blouses and colorful kilts—not the trousers for men, ankle-length skirts for women, which muffled the sad folk of Norstad. And there was educated conversation in the gentle Tierrans language, music from an open window, laughter on the verandas and children playing in the parks: freedom, law, and leisure.

The thought that this might be rubbed out of history, that the robots of Norstad and the snake-souled monsters of Kolresh might tramp between broken spires where starved Earthmen hid, was a tearing in Undama.

He managed to lift his drink and lean back with the proper casual elegance. "No, sir," he said, "they are not bluffing."

Nga Chilongo, Premier of the Federation Parliament, blinked unhappy eyes. He was a small grizzled man, and a wise man, but this lay beyond everything he had known in a long lifetime and he was slow to grasp it.

"But surely—" he began. "Surely this . . . this Rusch person is not insane. He cannot think that his two planets, with a population of, what is it, perhaps one billion, can overcome four billion Terrestrials!"

"There would also be several million Kolreshites to help," reminded Undama. "However, they would handle the naval end of it entirely—and their navy *is* considerably stronger than ours. The Norron forces would be the ones which actually landed, to fight the air and ground battles. And out of those paltry one billion, Rusch can raise approximately one hundred million soldiers."

Chilongo's glass crashed to the terrace. "What!"

"It's true, sir." The third man present, Mustafa Lefargo, Minister of Defense, spoke in a miserable tone. "It's a question of every able-bodied citizen, male and female, being a trained member of the armed forces. In time of war, virtually everyone not in actual combat is directly contributing to some phase of the effort—a civilian economy virtually ceases to exist. They're used to getting along for years at a stretch with no comforts and a bare minimum of necessities." His voice grew sardonic. "By necessities, they mean things like food and ammunition—not, say, entertainment or cultural activity, as we assume."

"A hundred million," whispered Chilongo. He stared at his hands. "Why, that's ten times our *total* forces!"

"Which are ill-trained, ill-equipped, and ill-regarded by our own civilians," pointed out Lefarge bitterly.

"In short, sir," said Unduma, "while we could defeat either Kolresh or Norstad-Ostarik in an all-out war—though with considerable difficulty—between them they can defeat us."

Chilongo shivered. Unduma felt a certain pity for him. You had to get used to it in small doses, this fact which Civilization screened from Earth: that the depths of hell are found in the human soul. That no law of nature guards the upright innocent from malice.

"But they wouldn't dare!" protested the Premier. "Our friends . . . everywhere—"

"All the human-colonized galaxy will wring its hands and send stiff notes of protest," said Lefarge. "Then they'll pull the blankets back over their heads and assure themselves that now the big bad aggressor has been sated."

"This note—of Rusch's." Chilongo seemed to be grabbing out after support while the world dropped from beneath his feet. Sweat glistened on his wrinkled brown forehead. "Their terms . . . surely we can make some agreement?"

"Their terms are impossible, as you'll see for yourself when you read," said Unduma flatly. "They want us to declare war on Kolresh, accept a joint command under Nor-

ron leadership, foot the bill and—No!"

"But if we have to fight anyway," began Chilongo, "it would seem better to have at least one ally—"

"Has Earth changed that much since I was gone?" asked Unduma in astonishment. "Would our people really consent to this . . . this extortion . . . letting those hairy barbarians write our foreign policy for us— Why, jumping into war, making the first declaration ourselves, it's unconstitutional! It's *un-Civilized!*"

Chilongo seemed to shrink a little. "No," he said. "No, I don't mean that. Of course it's impossible; better to be honestly defeated in battle. I only thought, perhaps we could bargain—"

"We can try," said Unduma skeptically. "but I never heard of Hans Rusch yielding an angstrom without a pistol at his head."

Lefarge struck a cigar, inhaled deeply, and took another sip from his glass. "I hardly imagine an alliance with Kolresh would please his own people," he mused.

"Scarcely!" said Unduma. "But they'll accept it if they must."

"Oh? No chance for us to get him overthrown — assassinated, even?"

"Not to speak of. Let me explain. He's only a petty aristocrat by birth, but during the last war with Kolresh he gained high rank and a personal following of fanatically loyal young officers. For the past few years, since the king died, he's been the dictator. He's filled the key posts

with his men: hard, able, and unquestioning. Everyone else is either admiring or cowed. Give him credit, he's no megalomaniac—he shuns publicity—but that simply divorces his power all the more from responsibility. You can measure it by pointing out that everyone knows he will probably ally with Kolresh, and everyone has a nearly physical loathing of the idea—but there is not a word of criticism for Rusch himself, and when he orders it they will embark on Kolreshite ships to ruin the Earth they love."

"It could almost make you believe in the old myths," whispered Chilongo. "About the Devil incarnate."

"Well," said Unduma, "this sort of thing has happened before, you know."

"Hm-m-m?" Lefarge sat up.

Unduma smiled sadly. "Historical examples," he said. "They're of no practical value today, except for giving the cold consolation that we're not uniquely betrayed."

"What do you mean?" asked Chilongo.

"Well," said Unduma, "consider the astropolitics of the situation. Around Polaris and beyond lies Kolresh territory, where for a long time they sharpened their teeth preying on backward autochthones. At last they started expanding toward the richer human-settled planets. Norstad happened to lie directly on their path, so Norstad took the first blow—and stopped them.

"Since then, it's been seven hundred years of stalemated war. Oh,

naturally Kolresh outflanks Norstad from time to time, seizes this planet in the galactic west and raids that one to the north, fights a war with one to the south and makes an alliance with one to the east. But it has never amounted to anything important. It can't, with Norstad astride the most direct line between the heart of Kolresh and the heart of Civilization. If Kolresh made a serious effort to by-pass Norstad, the Norrons could—and would—disrupt everything with an attack in the rear.

"In short, despite the fact that interstellar space is three-dimensional and enormous, Norstad guards the northern marches of Civilization."

He paused for another sip. It was cool and subtle on his tongue, a benediction after the outworld rot-gut.

"Hm-m-m, I never thought of it just that way," said Lefarge. "I assumed it was just a matter of barbarians fighting each other for the usual barbarian reasons."

"Oh, it is, I imagine," said Unduma, "but the result is that Norstad acts as the shield of Earth.

"Now if you examine early Terrestrial history—and Rusch, who has a remarkable knowledge of it, stimulated me to do so—you'll find that this is a common thing. A small semicivilized state, out on the marches, holds off the enemy while the true civilization prospers behind it. Assyria warding Mesopotamia, Rome defended Greece, the Welsh border lords kept England safe, the

Transoxanian Tartars were the shield of Persia, Prussia blocked the approaches to western Europe . . . oh, I could add a good many examples. In every instance, a somewhat backward people on the distant frontier of a civilization, receive the worst hammer-blows of the really alien races beyond, the wild men who would leave nothing standing if they could get at the protected cities of the inner society."

He paused for breath. "And so?" asked Chilongo.

"Well, of course suffering isn't good for people," shrugged Unduma. "It tends to make them rather nasty. The marchmen react to incessant war by becoming a warrior race, uncouth peasants with an absolute government of ruthless militarists. Nobody loves them, neither the outer savages nor the inner polite nations.

"And in the end, they're all too apt to turn inward. Their military skill and vigor need a more promising outlet than this grim business of always fighting off an enemy who always comes back and who has even less to steal than the sentry culture.

"So Assyria sacks Babylon; Rome conquers Greece; Percy rises against King Henry; Tamerlane overthrows Bajazet; Prussia clanks into France—"

"And Norstad-Ostarik falls on Earth," finished Lefarge.

"Exactly," said Unduma. "It's not even unprecedented for the border state to join hands with the very tribes it fought so long. Percy and

Owen Glendower, for instance . . . though in that case, I imagine both parties were considerably more attractive than Hans Rusch or Klerak Belug."

"What are we going to do?" Chilongo whispered it toward the blue sky of Earth, from which no bombs had fallen for a thousand years.

Then he shook himself, jumped to his feet, and faced the other two. "I'm sorry, gentlemen. This has taken me rather by surprise, and I'll naturally require time to look at this Norron protocol and evaluate the other data. But if it turns out you're right"—he bowed urbanely—"as I'm sure it will—"

"Yes?" said Unduma in a taunting voice.

"Why, then, we appear to have some months, at least, before anything drastic happens. We can try to gain more time by negotiation. We do have the largest industrial complex in the known universe, and four billion people who have surely not had courage bred out of them. We'll build up our armed forces, and if those barbarians attack we'll whip them back into their own kennels and kick them through the rear walls thereof!"

"I hoped you'd say that," breathed Unduma.

"I hope we'll be granted time," Lefarge scowled. "I assume Rusch is not a fool. We cannot restrain in anything less than a glare of publicity. When he learns of it, what's to prevent him from cementing the

Kolresh alliance and attacking at once, before we're ready?"

"Their mutual suspiciousness ought to help," said Undama. "I'll go back there, of course, and do what I can to stir up trouble between them."

He sat still for a moment, then added as if to himself: "Till we do finish preparing, we have no resources but hope."

The Kolreshite mutation was a subtle thing. It did not show on the surface: physically, they were a handsome people, running to white skin and orange hair. Over the centuries, thousands of Noeron spies had infiltrated them, and frequently gotten back alive; what made such work unusually difficult was not the normal hazards of impersonation, but an ingrained reluctance to practice cannibalism and worse.

The mutation was a psychic twist, probably originating in some obscure gene related to the endocrine system. It was extraordinarily hard to describe—every categorical statement about it had the usual quota of exceptions and qualifications. But one might, to a first approximation, call it extreme xenophobia. It is normal for *Homo sapiens* to be somewhat wary of outsiders till he has established their bona fides; it was normal for *Homo Kolreshi* to *bate* all outsiders, from first glimpse to final destruction.

Naturally, such an instinct produced a tendency to inbreeding, which lowered fertility, but system-

atic execution of the unfit had so far kept the stock vigorous. The instinct also led to strongarm rule within the nation; to nomadism, where a planet was only a base like the oasis of the ancient Bedouin, essential to life but rarely seen; to a cult of secrecy and cruelty, a religion of abominations; to an ultimate goal of conquering the accessible universe and wiping out all other races.

Of course, it was not so simple, nor so blatant. Among themselves, the Kolreshites doubtless found a degree of tenderness and fidelity. Visiting on neutral planets—i.e., planets which it was not yet expedient to attack—they were very courteous and had an account of defending themselves against one unprovoked aggression after another, which some found plausible. Even their enemies stood in awe of their personal heroism.

Nevertheless, few in the galaxy would have wept if the Kolreshites all died one rainy night.

Hans von Thoma Rusch brought his speedster to the great whale-back of the battleship. It lay a light-year from his sun, hidden by cold emptiness; the co-ordinates had been given him secretly, together with an invitation which was more like a summons.

He glided into the landing cradle, under the turrets of guns that could pound a moon apart, and let the mechanism suck him down below decks. When he stepped out into the high, coldly lit debarkation chamber, an honor guard in red presented

arms and pipes twittered for him.

He walked slowly forward, a big man in black and silver, to meet his counterpart. Klerak Belug, the Overman of Kolresh, who waited rigid in a blood-colored tunic. The cabin bristled around him with secret police and guns.

Rusch clicked heels. "Good day, your dominance," he said. A faint echo followed his voice. For some unknown reason, this folk liked echoes and always built walls to resonate.

Belug, an aging giant who topped him by a head, raised shaggy brows. "Are you alone, your lordship?" he asked in atrociously accented Norron. "It was understood that you could bring a personal bodyguard."

Rusch shrugged. "I would have needed a personal dreadnought to be quite safe," he replied in fluent Kolra, "so I decided to trust your safe conduct. I assume you realize that any harm done to me means instant war with my kingdom."

The broad, wrinkled lion-face before him split into a grin. "My representatives did not misjudge you, your lordship. I think we can indeed do business. Come."

The Overman turned and led the way down a ramp toward the guts of the ship. Rusch followed, enclosed by guards and bayonets. He kept a hand on his own sidearm—not that it would do him much good, if matters came to that.

Events were approaching their climax, he thought in a cold layer

of his brain. For more than a year now, negotiations had dragged on, hemmed in by the requirement of secrecy, weighted down by mutual suspicion. There were only two points of disagreement remaining, but discussion had been so thoroughly snagged on those that the two absolute rulers must meet to settle it personally. It was Belug who had issued the contemptuous invitation.

And he, Rusch, had come. Tonight the old kings of Norstad wept worms in their graves.

The party entered a small, luxuriously chaired room. There were the usual robots, for transcription and reference purposes, and there were guards, but Overman and Margrave were essentially alone.

Belug wheezed his bulk into a seat. "Smoke? Drink?"

"I have my own, thank you." Rusch took out his pipe and a hip flask.

"That is scarcely diplomatic," rumbled Belug.

Rusch laughed. "I'd always understood that your dominance had no use for the mannerisms of Civilization. I daresay we'd both like to finish our business as quickly as possible."

The Overman snapped his fingers. Someone glided up with wine in a glass. He sipped for a while before answering: "Yes. By all means. Let us reach an executive agreement now and wait for our hirelings to draw up a formal treaty. But it seems odd, sir, that after all these months of

delay, you are suddenly so eager to complete the work."

"Not odd," said Rusch. "Earth is rearming at a considerable rate. She's had almost a year now. We can still whip her, but in another six months we'll no longer be able to; give her automated factories half a year beyond *that*, and she'll destroy us!"

"It must have been clear to you, sir, that after the Earth Ambassador what's his name, Unduma—after he returned to your planets last year, he was doing all he could to gain time."

"Oh, yes," said Rusch. "Making offers to me, and then haggling over

them—brewing trouble elsewhere to divert our attention—a gallant effort. But it didn't work. Frankly, your dominance, you've only yourself to blame for the delays. For example, your insisting that Earth be administered as Kolreshite territory—"

"My dear sir!" exploded Belag. "It was a talking point. Only a talking point. Any diplomatist would have understood. But you took six weeks to study it, then offered that preposterous counter-proposal that everything should revert to *you*, loot and territory both— Why, if you had been truly willing to co-operate, we could have settled the terms in a month!"



"As you like, your dominance," said Rusch carelessly. "It's all past now. There are only these questions of troop transport and prisoners, then we're in total agreement."

Klerak Belug narrowed his eyes and rubbed his chin with one outsize hand. "I do not comprehend," he said, "and neither do my naval officers. We have regular transports for your men, nothing extraordinary in the way of comfort, to be sure, but infinitely more suitable for so long a voyage than . . . than the naval units you insist we use. Don't you understand? A transport is for carrying men or cargo; a ship of the line is to fight or convoy. You do *not* mix the functions!"

"I do, your dominance," said Rusch. "As many of my soldiers as possible are going to travel on regular warships furnished by Kolresh, and there are going to be Double Kingdom naval personnel with them for liaison."

"But—" Belug's fist closed on his wineglass as if to splinter it. "Why?" he roared.

"My representatives have explained it a hundred times," said Rusch wearily. "In blunt language, I don't trust you. If . . . oh, let us say there should be disagreement between us while the armada is en route . . . well, a transport ship is easily replaced, after its convoy vessels have blown it up. The fighting craft of Kolresh are a better hostage for your good behavior." He struck a light to his pipe. "Naturally, you

can't take our whole fifty-million-man expeditionary force on your battle wagons; but I want soldiers on every warship as well as in the transports."

Belug shook his ginger head. "No."

"Come now," said Rusch. "Your spies have been active enough on Norstad and Ostarik. Have you found any reason to doubt my intentions? Bearing in mind that an army the size of ours cannot be alerted for a given operation without a great many people knowing the fact—"

"Yes, yes," grumbled Belug. "Granted." He smiled, a sharp flash of teeth. "But the upper hand is mine, your lordship. I can wait indefinitely to attack Earth. You can't."

"Eh?" Rusch drew hard on his pipe.

"In the last analysis, even dictators rely on popular support. My Intelligence tells me you are rapidly losing yours. The queen has not spoken to you for a year, has she? And there are many Norrons whose first loyalty is to the Crown. As the thought of war with Earth seeps in, as men have time to comprehend how little they like the idea, time to see through your present anti-Terrestrial propaganda—they grow angry. Already they mutter about you in the beer halls and the officers' clubs, they whisper in ministry cloak-rooms. My agents have heard.

"Your personal cadre of young key officers are the only ones left

with unquestioning loyalty to you. Let discontent grow just a little more; let open revolt break out, and your followers will be hanged from the lamp posts.

"You can't delay much longer."

Rusch made no reply for a while. Then he sat up, his monocle glittering like a cold round window on winter.

"I can always call off this plan and resume the normal state of affairs," he snapped.

Belug flushed red. "War with Kolresh again? It would take you too long to shift gears—to reorganize."

"It would not. Our war college, like any other, has prepared military plans for all foreseeable combinations of circumstances. If I cannot come to terms with you, Plan No. So-and-So goes into effect. And obviously it will have popular enthusiasm behind it!"

He nailed the Overman with a fish-pale eye and continued in frozen tones: "After all, your dominance, I would prefer to fight you. The only thing I would enjoy more would be to hunt you with hounds. Seven hundred years have shown this to be impossible. I opened negotiations to make the best of an evil bargain—since you cannot be conquered, it will pay better to join with you on a course of mutually profitable imperialism.

"But if your stubbornness prevents an agreement, I can declare war on you in the usual manner and be no

worse off than I was. The choice is, therefore, yours."

Belug swallowed. Even his guards lost some of their blankness. One does not speak in that fashion across the negotiators' table.

Finally, only his lips stirring, he said: "Your frankness is appreciated, my lord. Some day I would like to discuss that aspect further. As for now, though . . . yes, I can see your point. I am prepared to admit some of your troops to our ships of the line." After another moment, still sitting like a stone idol: "But this question of returning prisoners of war. We have never done it. I do not propose to begin."

"I do not propose to let poor devils of Norrons rot any longer in your camps," said Rusch. "I have a pretty good idea of what goes on there. If we're to be allies, I'll want back such of my countrymen as are still alive."

"Not many are still sane," Belug told him deliberately.

Rusch puffed smoke and made no reply.

"If I give in on the one item," said Belug, "I have a right to test your sincerity by the other. We keep our prisoners."

Rusch's own face had gone quite pale and still. It grew altogether silent in the room.

"Very well," he said after a long time. "Let it be so."

Without a word, Major Othkar Grasborg led his company into the black cruiser. The words came from

the spaceport, where police held off a hooting, hissing, rock-throwing mob. It was the first time in history that Norron folk had stoned their own soldiers.

His men tramped stolidly behind him, up the gangway and through the corridors. Among the helmets and packs and weapons, ratcheting boots and clashing body armor, their faces were lost, they were an army without faces.

Graaborg followed a Kolreshite ensign, who kept looking back nervously at these hereditary foes, till they reached the bunkroom. It had been hastily converted from a storage hold, and was scant cramped comfort for a thousand men.

"All right, boys," he said when the door had closed on his guide. "Make yourselves at home."

They got busy, opening packs, spreading bedrolls on bunks. Immediately thereafter, they started to assemble heavy machine guns, howitzers, even a nuclear blaster.

"You, there!" The accented voice squawked indignantly from a loud-speaker in the wall. "I see that. I got video. You not put guns together here."

Graaborg looked up from his inspection of a live fission shell. "Ob-scenity you," he said pleasantly. "Who are you, anyway?"

"I exclusive officer. I tell captain."

"Go right ahead. My orders say that according to treaty, as long as we stay in our assigned part of the ship, we're under our own discipline. If your captain doesn't like it, let

him come down here and talk to us." Graaborg ran a thumb along the edge of his bayonet. A wolfish chorus from his men underlined the invitation.

No one pressed the point. The cruiser lumbered into space, rendezvoused with her task force, and went into nonspatial drive. For several days, the Norron army contingent remained in its den, more patient with such stinking quarters than the Kolreshites could imagine anyone being. Nevertheless, no spaceman ventured in there; meals were fetched at the galley by Norron squads.

Graaborg alone wandered freely about the ship. He was joined by Commander von Brocca of Ostarik, the head of the Double Kingdom's naval liaison on this ship: a small band of officers and ratings, housed elsewhere. They conferred with the Kolreshite officers as the necessity arose, routine problems, rehearsal of various operations to be performed when Earth was reached a month hence—but they did not mingle socially. This suited their hosts.

The fact is, the Kolreshites were rather frightened of them. A spaceman does not lack courage, but he is a gentleman among warriors. His ship either functions well, keeping him clean and comfortable, or it does not function at all and he dies quickly and mercifully. He fights with machines, at enormous ranges.

The ground soldier, muscle in mud, whose ultimate weapon is whetted steel in bare hands, has a different kind of toughness.

Two weeks after departure, Graaborg's wrist chronometer showed a certain hour. He was drilling his men in full combat rig, as he had been doing every "day" in spite of the narrow quarters.

"Ten-SHUN!" The order flowed through captains, lieutenants, and sergeants; the bulky mass of men crashed to stillness.

Major Graaborg put a small pocket amplifier to his lips. "All right, lads," he said casually, "assume gas masks, radiation shields, all gun squads to weapons. Now let's clean up this ship."

He himself blew down the wall with a grenade.

Being perhaps the most thoroughly trained soldiers in the universe, the Norron men paused for only one amazed second. Then they cheered, with death and hell in their voices, and crowded at his heels.

Little resistance was met until Graaborg had picked up von Brocca's naval command, the crucial ones, who could sail and fight the ship. The Kolreshites were too dumfounded. Thereafter the nomads rallied and fought gamely. Graaborg was handicapped by not having been able to give his men a battle plan. He split up his forces and trusted to the intelligence of the nomads.

His faith was not misplaced, though the ship was in poor condition by the time the last Kolreshite had been machine-gunned.

Graaborg himself had used a bayonet, with vast satisfaction.

M'Katze Unduma entered the office in the Witch Tower. "You sent for me, your lordship?" he asked. His voice was as cold and bitter as the gale outside.

"Yes. Please be seated." Margrave Hans von Thoma Rusch looked tired. "I have some news for you."

"What news? You declared war on Earth two weeks ago. Your army can't have reached her yet." Unduma leaned over the desk. "Is it that you've found transportation to send me home?"

"Somewhat better news, your excellency." Rusch leaned over and tuned a telescreen. A background of clattering robots and frantically busy junior officers came into view.

Then a face entered the screen, young, and with more life in it than Unduma had ever before seen on this sullen planet. "Central Data headquarters— Oh, yes, your lordship." Boyishly, against all rules: "We've got her! The *Bbooka* just called in . . . she's ours!"

"Hm-m-m. Good." Rusch glanced at Unduma. "The *Bbooka* is the superdreadnought accompanying Task Force Two. Carry on with the news."

"Yes, sir. She's already reducing the units we failed to capture. Admiral Sorrens estimates he'll control Force Two entirely in another hour. Bulletin just came in from Force Three. Admiral Gundrup killed in fighting, but Vice Admiral Smitt has assumed command and reports three-fourths of the ships in our hands. He's delaying fire until he sees how it goes aboard the rest. Also—"

"Never mind," said Rusch. "I'll get the comprehensive report later. Remind Staff that for the next few hours all command decisions had better be made by officers on the spot. After that, when we see what we've got, broader tactics can be prepared. If some extreme emergency doesn't arise, it'll be a few hours before I can get over to HQ."

"Yes, sir, Sir, I . . . may I say—" So might the young Norron have addressed a god.

"All right, son, you've said it." Rusch turned off the screen and looked at Unduma. "Do you realize what's happening?"

The ambassador sat down; his knees seemed all at once to have melted. "What have you done?" It was like a stranger speaking.

"What I planned quite a few years ago," said the Margrave.

He reached into his desk and brought forth a bottle. "Here, your excellency. I think we could both use a swig. Authentic Terrestrial Scotch. I've saved it for this day."

But there was no glory leaping in him. It is often thus, you reach a dream and you only feel how tired you are.

Unduma let the liquid fire slide down his throat.

"You understand, don't you?" said Rusch. "For seven centuries, the Elephant and the Whale fought, without being able to get at each other's vitals. I made this alliance against Earth solely to get our men aboard their ships. But a really large operation like that can't be faked.

It has to be genuine—the agreements, the preparations, the propaganda, everything. Only a handful of officers, men who could be trusted to . . . to infinity"—his voice cracked over, and Unduma thought of war prisoners sacrificed, hideous casualties in the steel corridors of spaceships, Norron gunners destroying Kolreshite vessels and the survivors of Norron detachments which failed to capture them—"only a few could be told, and then only at the last instant. For the rest, I relied on the quality of our troops. They're good lads, every one of them, and therefore adaptable. They're especially adaptable when suddenly told to fall on the men they'd most like to kill."

He tilted the bottle afresh. "It's proving expensive," he said in a slurred, hurried tone. "It will cost us as many casualties, no doubt, as ten years of ordinary war. But if I hadn't done this, there could easily have been another seven hundred years of war. Couldn't there? Couldn't there have been? As it is, we've already broken the spine of the Kolreshite fleet. She has plenty of ships yet, to be sure, still a menace, but crippled. I hope Earth will see fit to join us. Between them, Earth and Norstad-Ostank can finish off Kolresh in a hurry. And after all, Kolresh *did* declare war on you, had every intention of destroying you. If you won't help, well, we can end it by ourselves, now that the fleet is broken. But I hope you'll join us."

"I don't know," said Unduma. He was still wobbling in a new cosmos. "We're not a . . . a hard people."

"You ought to be," said Rusch. "Hard enough, anyway, to win a voice for yourselves in what's going to happen around Polaris. Important frontier, Polaris."

"Yes," said Unduma slowly. "There is that. It won't cause any hosannahs in our streets, but . . . yes, I think we will continue the war, as your allies, if only to prevent you from massacring the Kolreshites. They can be rehabilitated, you know."

"I doubt that," granted Rusch. "But it's a detail. At the very least, they'll never be allowed weapons again." He raised a sardonic brow. "I suppose we, too, can be rehabilitated, once you get your peace groups and psychotechs out here. No doubt you'll manage to demilitarize us and turn us into good plump democrats. All right, Un-

duma, send your Civilizing missionaries. But permit me to give thanks that I won't live to see their work completed!"

The Earthman nodded, rather coldly. You couldn't blame Rusch for treachery, callousness, and arrogance—he was what his history had made him—but he remained unpleasant company for a Civilized man. "I shall communicate with my government at once, your lordship, and recommend a provisional alliance, the terms to be settled later," he said. "I will report back to you as soon as . . . ah, where will you be?"

"How should I know?" Rusch got out of his chair. The winter night howled at his back. "I have to convene the Ministry, and make a public telecast, and get over to Staff, and—No. The devil with it! If you need me inside the next few hours, I'll be at Sorgenlos on Ostarik. But the matter had better be urgent!"

THE END





NEEDLER

BY RANDALL GARRETT

*The Aliens had a weapon that was a deadly thing
—yet seemingly was useless to them! How do you
solve a problem when you don't know what it is, and
your enemy doesn't know he's doing it, though. . . ?*

Illustrated by Emsh

"The principal difficulty in the case . . . lay in the fact of there being too much evidence. What was vital was overlaid and hidden by what was irrelevant."

Sherlock Holmes

They just didn't give a damn. The first load of survivors brought back after the Battle of Leymon's Star had been short-circuited somewhere, and they didn't give two hoots whether they lived or died.

The same thing happened to the crew of the GSS *Bedonin* after the skirmish in the Great Rift. The *Bedonin* was found drifting along, out of control, after having demolished an enemy vessel with a blast of the new *a/g* guns.

It was a case of "the operation was a success, but the doctor died." Or might as well have.

The crewmen of the fighting ships were in a state of semicatatonia.

The alien ships were burned and blasted out of space, with the exception of those which turned tail and ran. The survivors in the human ships were picked up and taken to Kendoris VI, the Galactic Main Base of the Interstellar Fleet.

Fleet Commander Allerdyce hospitalized the men and turned the problem over, to the Civilian Research Corps. General Director Bukster frowned over the whole mess, fired out assignments right and left, and dumped the bulk of the responsibility into the lap of Roysland Dwyn, chief of the Special Weapons Group.

Dwyn immediately asked for a



specimen from the Fleet Hospital Psychiatric Ward.

Bilford, the chief psychometrist, brought one of the crew members from the *Bedonin* into the office of the head of Special Weapons four days after the survivors had been picked up.

Roysland Dwyn glanced up from the work at his desk when Bilford entered. Behind the huge plastic block of the desk, he looked no larger than the average man. It was only when he stood that it became apparent that Roysland Dwyn was two sizes larger than the average man, regardless of where you measured.

Bilford walked on into the office "You wanted to see Captain Gower, Roysland?"

Royland nodded his massive head. "Bring him in; I want to get the whole picture on this business."

Bilford nodded and turned back toward the door. His eyes looked sad and pitying, and he ran a lean, nervous hand through his bushy gray hair as he called out: "All right, Captain Gisser—come in here."

As Captain Gisser strolled in from the outer office, Royland watched him carefully.

Gisser was tall and graceful, in the near-perfect physical trim of a fighting man. He moved with military precision, but without the stiff rigidity of formal marching. He took one step through the door—and stopped.

Royland narrowed his gray eyes and looked at the captain's face. The expression on it was definitely not the sleepy, glazed look of the hypnotic catatonic. After a moment, Royland decided it could be described as a sort of apathetic introspection.

"How long will he stand like that?" he asked Bilford.

Bilford spread his hands. "Until someone tells him to move or he collapses from lack of food or sheer fatigue."

"Have him sit down over there." Royland pointed. "No use making the poor guy stand up."

"Go over to that chair and sit down," Bilford told the captain. Gisser did as he was told.

Bilford pulled up another chair

and sat down. "Why'd you want to see him?" he asked. "I mean, do you have anything in mind?"

Royland shook his head. "Nothing specific; I'm just trying to see every angle of this. The Enlisa have a new weapon; we've got to do something to counteract it. So far, we don't know anything about it except that it bollixes up the brain—and that isn't very useful. It's like trying to deduce the existence of a pistol from the holes in the target."

"Worse," Bilford said gloomily; "we don't even have a hole to analyze."

"Yes, we do. A psychic hole." Royland gestured toward the silent captain. "Are they all like that?"

"Essentially, yes," Bilford said.

"Can he hear what I'm saying? I mean, can he understand me?"

"That's a hard question to answer. I should say that the understanding was of a very low level. Here, I'll show you what I mean." He turned and looked directly at the seated spaceman.

"Captain Gisser, how old are you?" he asked in a firm, clear voice.

There was no answer.

"Gisser, when were you born?"

Still no answer.

"Gisser, tell us when you were born."

"Twelve, Eight, Seven sixty-four," Gisser said promptly.

Bilford looked back at Royland. "He won't do anything on his own; there's absolutely no conscious volition. He has to be told what to do,

"Just asking him a question isn't enough; you have to insist on the answer. That's what I meant by saying that his understanding is on a very low level. He can't even deduce the presence of an unspoken command."

Roysland frowned and started to say something, but he was interrupted by a flicker of light on his desk panel.

He looked at Bilford. "The boss," he said dryly. Then he pressed a stud.

Light flickered in the air and coalesced into the seated figure of a portly, smiling, middle-aged man. The image wavered a little, then settled into an illusion of material solidity.

General Director Eckisster smiled and said: "Are we getting anywhere, gentlemen?"

"We're just getting started," Roysland said.

Eckisster nodded. "I see." His eyes lit on the captain, who was still sitting in the same position he had taken when he was ordered in to the chair. "Is this one of the *Bedouin's* men?"

It was Bilford who answered. "Yes, sir. Captain Glisser, Prime Officer."

"And you haven't found out anything about him yet? Don't you know what's wrong with these men?" Eckisster's voice was bland on the surface, but there was a biting hardness underneath.

"We know what's wrong with

them, sir," Bilford said stiffly; "we just don't know what caused it."

"According to the electroencephaloscope readings, the electrical activity of the prefrontal lobes is exhibiting a loop-feedback pattern. It's going around in circles without getting anywhere. As far as the nerve impulses are concerned, these men have been effectively lobotomized—almost completely so."

"I see." Eckisster looked at the captain again. "Captain, stand up." The captain stood. "Sit down." The officer sat. Eckisster rubbed a plump finger over his chin. "That's according to the report, at least. Would he kill himself if I asked him to?"

"Not if you *asked* him to," Bilford said coldly. "He might if you *told* him to. Do you want me to try it?"

"Don't be ridiculous!" the general director snapped. He looked at Roysland, who had been sitting quietly, waiting for Eckisster to finish. "Roysland, do you have any idea of the nature of this weapon?"

"None, sir," Roysland said quietly. "Neither I nor the psychologists have any idea what could do this to the human brain."

"Oh, no?" Eckisster's plump face smiled. "Haven't I heard something about microwaves at high intensity?"

Roysland nodded. "Sure. I know what you mean. But I was talking about doing it over a range of seven hundred million miles.

"We know that it can be done, but we don't know how the enemy did it. Look at it this way: If we'd

found every one of these men with his skull bashed in, we could say that it had been done with a club. But that still wouldn't explain how it was done from better than a light-hour away."

"Besides," Bilford chipped in, "high intensity microwaves don't have that effect. They affect the brain, sure—but not that way."

Eckister nodded and folded his hands placidly. "I understand. Well, gentlemen, I—" He stopped suddenly and looked to one side, out of the range of his pickup. A voice said: "This facsimile just came in on the ultrabeam, sir."

A hand materialized out of nowhere, holding a fac sheet, Eckister took it, unfolded it, and read it. His eyes opened a trifle wider, and he looked up at Royland.

"Royland, they've used it again. The *Kulliver* was picked up this side of the Noie Nebula, near Poulderr. They found her because of the automatic signals. Every man aboard was just like Captain Whatsisname, there. They're bringing the ship here, to Kandonis." He paused and looked at both men in turn. "If this keeps up," he said, "they'll have us whipped. It's your job to keep them from doing that. Now, you've got several trails to follow. Follow them, and get some answers; that's all."

His hand touched the arm rest of his chair, and abruptly the image dissolved into transparent air.

Bilford looked at Royland. "I don't like the way he keeps needling

people," he said. "It gets under my skin."

Royland stood up. "He thinks that's the best way to get things done. Maybe it is; I really don't know. I do agree with him in one respect: we *have* to do something—what, I don't know, but something."

"We've been fighting the Enliss for eighteen years. Up until last year, when we invented the *af* gun, there hadn't been an improvement on either side; they were winning because they had more ships."

"Then we get the *af* gun functioning, and use it against them; and when we do, it turns out that they have an even better weapon. I know what they mean when they say war is hell."

He stopped and looked at the captain. "Well, let's get on with it; I want to ask him a few questions."

Eighteen years of fighting hadn't seriously damaged either side, insofar as actual loss of life was concerned. Men in ships had been killed, of course, but no civilian had yet lost his life as a direct result of the Enliss-Human war. The Enliss hadn't gotten in close enough to occupied planets—yet.

But, until a year ago, it had seemed inevitable that they would. The screen of ships that ranged around the periphery of the human-inhabited section of the galaxy was getting thinner all the time. The Enliss had more ships, and, rather than

make a direct attack, they seemed to prefer to punch at the screen, weakening it steadily.

But the Enlissa had underestimated human ingenuity. Both sides had been relying on the ultralight torpedoes to knock each other out of the sky, and humanity had realized that they had to have something better. So they had come up with the *af* projector. If matter can be projected through the no-space of ultralight velocities, why not energy?

The result was as devastating a heat beam as any dreamer could logically expect; all the energy of a nuclear reaction focused along a narrow locus of no-space toward the enemy ship. Even a shielded hull gives under bombardment like that.

It looked as though the war was won. That is, it did until ships came back with mindless crews.

The *Killiver* was sitting in its launching cradle at the far side of the ten-mile-square Grand Port of Kandoris. Roysland didn't bother to take the tubeway; he flashed his credentials and commandeered a surface jeep. Belford had already taken charge of the crew, but Roysland wasn't worried about *them*; he wanted a look at the ship.

The *Killiver* was swarming with inspectors and special government investigators. Roysland jumped out of the jeep as it slowed near the giant sphere of the ship, and strode toward the ring of guards that surrounded the globe.

One of the guards looked up at

Roysland's huge frame and said: "May I see your pass, sir?"

Roysland pulled out his pass and handed it to the guard.

The guard barely glanced at it; then he shook his head. "I'm sorry, sir; this is a general pass. You'll have to get one of the special passes for this ship. The Inspection Division has—"

"Where the devil do I get a pass?" Roysland snapped.

"You'll have to apply at Inspection," the guard said. "In person," he added.

Roysland shook his hand. "I'm not going twelve miles back to Administration. Who's in charge here?"

"Inspector Gowlan, sir."

"Call him; tell him Roysland Dwyn wants to see him."

The guard hesitated for a moment, then spoke softly into the communicator on his wrist. The speaker in his ear buzzed a reply. "He'll be right out," said the guard.

A moment later, a dark-haired, average-sized man in a chief inspector's uniform fell through the drop chute from the ship and crossed the open space toward Roysland. "Roysland Dwyn?" he said, holding out his hand. "You're Special Weapons, aren't you? I'm Gowlan."

Roysland nodded and gripped the proffered hand in his own great paw. "Glad to know you. I want to get on that ship."

The inspector shook his head. "Fraid not . . . not without a special pass. We've got to make damage estimates."

"That ship is equipped with *aj* projectors," Roysland said. "My gang designed and built them from the ground up; I know more about them than you do. I want to see them—and the rest of the ship. I haven't got time to go gallivanting all over this base getting signatures on a blasted pass."

The inspector started to say something, but Roysland cut him off. "You can check with Eckisster, if you want; but hurry it up."

Gowlan looked up into Roysland's eyes, hesitated, then spoke into his wrist phone.

Less than two minutes later, Roysland was inside the ship.

The *Killiver* was in almost perfect shape. The *aj* guns appeared to be in perfect operating condition, and the meters showed that three of them had tracked and fired at something that had passed the upper starboard quadrant of the vessel.

Roysland checked the recordings, then looked up at Gowlan, who had elected to follow him. "Any sign of the ship they were firing at?"

Gowlan shrugged. "The Space-fleet men didn't find anything. If the *Killiver* holed it, they would still probably be light-years away from where the ship was found."

"What made them skitter off like that?"

Gowlan looked at him. "I don't get it. What do you mean?"

Roysland waved his hand to indicate their surroundings. The corridors and rooms of the great ship

were swarming with inspectors, who were photographing and checking every square centimeter of the ship.

"What happened? Why have we got this ship?" Roysland asked.

Gowlan thought for a moment, then nodded slowly. "I see what you're getting at. Let's see—

"The *Killiver* is cruising in ultra-drive. They pick up a blip on the detector; it's an enemy ship. They're too far away to torpedo, but they're well within range of the *aj* projectors. That gets us up to the moment of firing." He stopped and his frown deepened. "Wait a second; that doesn't make sense."

Roysland raised an eyebrow. "What doesn't?"

"Well, look here: The gunners would have had to be awake when the *aj's* were fired. All right; that means they tracked the *Enlissa* ship, then cut in the automatics to fire the *aj's*. They must have missed, because the *Enlissa* used the mindjammer *after* the *aj's* were fired.

"But if that's so, then why didn't the *Enlissa* ship capture the *Killiver*?"

It was a good point. Roysland frowned and turned the thing over in his mind. A spaceship is expensive—hellishly expensive; the cost of a fleet of scagoing battleships is nothing in comparison. So you don't waste ships, even the enemy's. The whole object of a space battle is to destroy the enemy crew without destroying the ship. Even a badly-damaged interstellar vessel is worth saving.

The *Killdeer* was in excellent condition. If the *Enlissa* ship were still in good shape after the battle, why hadn't they taken the *Killdeer*?

"The only thing I can figure," Gowlan said, "is that the *Enlissa* ship fired their mindjammer just after the *a's* were fired—almost at the same time, you might say." He grinned. "Sure. That's what must have happened."

Roysland nodded. "It looks like the only explanation," he agreed. "That is, except for one thing."

"What's that?" Gowlan wanted to know.

"Why has the same coincidence occurred in three different battles, in widely separated parts of the galaxy?"

Gowlan's face lost its self-satisfied look. "Yeah," he said softly. "Yeah. Why?"

"Kick that around a while," Roysland said, grinning. "If you come up with anything, let me know."

Roysland Dwyn spent the next two days sitting in his office with his feet on his desk, leaning back in a chair that creaked ominously with his weight. The only interruptions were for food and sleep—except when one of his staff called in with new data, which was rare.

He got one call from Milford. The microwave business that the general director suggested had shown some promise of snapping the stricken crews out of their apathy. Some of the men were improving rapidly, and others more

slowly; but all of them were showing some positive response to the treatment.

On the afternoon of the second day, he got a call from Eckisster. The old man didn't look particularly jovial. His image solidified with a scowl on it. "What have you got on this microwave business?" he snapped.

Roysland lifted his big boots off the desk and leaned forward leisurely. "Nothing."

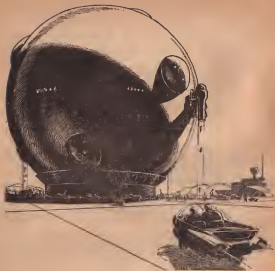
"You'd better get something fast," the general director said. "They're attacking shipping now, and they're well within the periphery."

Roysland jerked erect. "*What? What happened?*"

Eckisster's lower lip curled. "Don't use that tone of voice on me, Roysland. I don't like it. I want you to find out a few things. What's happening? Why do they attack this way and do nothing? What sort of gadget do they have? Is there any defense against it? Can we make it? Can we—"

His voice trailed off. Roysland had stood up and walked around his desk until he was less than a yard from the image of the general director. He knew full well that his own image in the director's office was doing the same thing. And in spite of the fact that Eckisster knew the image was harmless, Roysland's impressive mass quieted him.

When he spoke, Roysland's voice was low. "Now you listen to me, Eckisster. You want me to solve this problem. O.K. I want to figure it



out as much as you do, but I can't do a thing without data. I have to know what has happened, and I have to know exactly how it happened. So don't come busting in on me with a lot of vague hints when I'm thinking. I don't have to put up with that sort of stuff; either give me the data on what happened, or go yak at someone else while I figure this out without any help from you."

Eckisster looked up at the bulk of bone and muscle that towered over him. "Don't get excited, Roysland," he said. "I'll forgive your impertinence; it's just that I'm so worried, myself."

"O.K. You're excused, too. Now, what's this about shipping being attacked?"

Eckisster glanced to one side and reached for something outside the pickup field. The end of his arm

vanished and reappeared holding a sheaf of papers. "Of course, a copy of this will be sent to your office right away, but I can give you the essentials now.

"Two unarmed cargo vessels left Belixa III a week ago, bound for Niadel V. They were escorted by a light cruiser of the *Sidney* class. They were picked up, of course, after they had passed the Niadel sun; nobody on board had even bothered to eat for four days.

"They probably wouldn't have been found at all if they'd been ordinary merchant vessels, but the local government on Niadel V was looking for them; there'd been an epidemic of some sort there, and these ships were on an emergency run with antibiotics of some kind."

Royland stepped back and sat on the edge of his desk. "Got all three of them?"

"All three of them," said Eckister emphatically. "Now, I'll send this report over to you immediately. We'll have to get some action. If the *Enlissa* can get in this close, they may decide to attack Kandoris itself! Your job is Special weapons. Find a screen of some sort that will protect us from this—whatever it is."

"Call it a mindjammer," Royland said. "One of the inspectors used that word, and I kind of like it."

"You like it," Eckister's voice was cutting. "I don't like anything that does *that* to a human brain. Get busy and find some way to beat it."

Royland started to explain that he liked the word—not the object—but the general director's image was already dissolving. Royland stepped back behind his desk and dialed a number. A few seconds later, Balford's image materialized. The nervous little man looked more nervous than ever.

"What is it, Royland? More trouble? I hope not, I've had Eckister on my neck all morning."

"I know; I just got him off mine. But I wanted to ask you something. Is there any correlation between the frequencies that help those men and the frequency of the feedback circuit in their prefrontal lobes?"

Balford frowned in thought. "I don't know; I'd never thought of it from that angle. They don't have any obvious correlation, I can tell you that, I'll check on it, though. I'll run it through the differential analyzer."

Royland nodded. "Try that. Let me know if you get anything."

He cut Balford off and dialed another number. The image that appeared this time was wearing the uniform of a fleet commander.

"Commander Allerdyce, do you mind if I ask you a couple of questions?"

"Go ahead, Royland. What is it? I hope you're not going to needle me the way your boss does. I'd have tossed him out of my office, except that you can't grab a solidiphone image. Best I could do was shut him off, which was very unsatisfac-

tory." The commander grinned wryly at the thought.

A big grin spread itself across Roysland's blocky face. "I know how you feel. No, commander, I just wanted to ask a couple of questions, as I said.

"You're familiar with the details of the Enlissa attack on that medical supply convoy?"

The fleet commander nodded.

"Well," Roysland continued, "what would happen if you were in command of the cruiser and you found a trace on the scope that indicated an Enlissa ship?"

"The orders cover that," said the commander. "The cruiser cuts in with the *af* guns before the Enlissa ship gets within torpedo range."

"And this always works?"

The commander shrugged. "It always has so far, the *af*'s knock them out of space before they can get close enough to launch screenbuster torpedoes accurately. But this new gadget they've got evidently has as great a range as the *af* projectors."

"Or greater," Roysland added.

"Yeah," said Allerdyce softly, "or greater."

"Is there any other possibility?" Roysland wanted to know.

The commander nodded. "One—if the Enlissa were lucky, that is. If the enemy ship could have approached the convoy by coming in directly from a star, the subetheric radiation from the sun behind them would blank out their own radiation, and they could get in pretty close before they registered on a screen.

"But in order to do that, they'd have to know the convoy's course and lie in wait for it. If they actually did use a star to hide themselves, it was probably pure luck on their part that they happened to be in the right place at the right time."

Roysland nodded slowly, his eyes narrowed in thought. "I wonder—" he said finally. "Would you do me a favor, commander? Would you check and see if that cruiser actually fired towards a sun? That might give us some information."

"I'll check," Allerdyce said. "It'll be on the recorders. I'll let you know what I come up with."

"Fine," said Roysland. "I'll see you later." He cut off, and his image disintegrated.

Roysland looked at the dark, blurred reflection of his face in the black plastic of his desk for a moment, then grinned. "All right, buster," he said to the face in the desk, "you're stuck for a while, anyway. Time to call in some help."

He touched a switch plate on his desk panel and said: "Call a meeting of the Special Weapons Staff at my home at twenty-nine hundred hours."

He touched another plate and said: "As soon as the report from the general director comes in, have it transferred to my home."

And another: "Send all data to date on the enemy's latest weapon to my home. Code it *Mindjammer*."

Then he got up, shut off his desk, and went out. An early meal was on the agenda, it seemed.

Blackpool's Restaurant was, as usual, well populated, but not overcrowded. Roysland managed to find a table in the rear, where he sat down and ordered a tall glass of fruit juice. He liked Blackpool's; its old-fashioned, almost primitive atmosphere was impressive without being phony. The waiters—remote-control humanoids guided by the vast robot brain in the basement—were dressed in the fluffy, bright, fluorescent clothing of a style that had been worn two centuries before, when Blackpool's had been built. The uniforms had never changed.

Roysland consulted the menu, told the waiter what he wanted, and went back to his fruit juice.

"Roysland? Mind if I pull in?"

Roysland looked up at the short, round-faced, smiling man standing by the table. "Not at all Osteban; sit down." Roysland didn't particularly want to talk to him then, but it wouldn't do to offend the Galactic News Service. Roysland waved the man to a seat and asked him if he wanted a drink.

Osteban eyed his host's drink. "What are you drinking? Want to let me taste it?" He took the glass, sipped at it, and made a wry face. "Frevvinsake! Mind if I have something with life in it?"

Roysland said he didn't, and Osteban ordered something more potent. When the waiter brought it, he took a healthy swallow and then said: "Mind if I ask a question?"

"Ask to your heart's content," Roysland said. "You will, anyway.

But I don't guarantee any answers."

"Did you ever?" He took another swallow of liquid. "What's in this rumor that the Enlissa have invented a gadget that drives people crazy?"

"I haven't heard any such rumor," Roysland said. It was a perfectly true statement, if a trifle incomplete.

"Did I ask if you'd heard it?" Osteban countered.

"Tell me something, Osteban," Roysland said seriously. "Did you ever use a declarative sentence in your life?"

"What do you mean? Let's quit the kidding, shall we? Didn't you understand my question—or are you playing dumb?" Osteban grinned as he said it, making it totally inoffensive.

Roysland flipped a coin, mentally. It came down tails, and Osteban lost. "I can't speak officially, of course," Roysland said. "I'll just have to be a 'reliable anonymous source.' But I can tell you this: We don't know what the Enlissa may or may not have; but we haven't lost any ships because of any insanity rays, or what have you."

"Is that a fact?" Osteban thought for a moment. "I guess it is or you wouldn't say it, would you?"

They drank in silence for a few moments, then Osteban said: "All right, tell me something else, will you? These new *aj* projectors have been on active duty for half a year or so, haven't they? They're supposed to be hot stuff, right? Then why is it that they haven't destroyed any enemy ships? Why is it that all

the communiques always say: 'The Enlissa ship was finally destroyed by ultralight torpedoes.'

Roysland frowned. "I didn't know that was the case. However, I think I can hazard a guess. An *af* projector requires the installation of a big no-space generator, similar to the one that drives the ship. They're expensive when they get that big, and only a few of the larger battle-ships have been equipped with them.

"Now, actually, what are the odds that any particular ship will make shooting contact with the enemy? Very small. The probable reason that no enemy ships have been destroyed by *af* projectors is that no *af* ships have come in contact with the enemy."

"Do you think that's it?" The reporter grinned and took a final sip from his glass, draining it. "Well, I guess I can't get a story out of you, can I? O.K., then; will I see you around?"

"Sure," said Roysland. "Take it easy."

But the reporter had ruined his dinner. What was there about the casualty statistics that was unusual? Was there any more information in that area? He'd have to check and see.

The executive staff of Special Weapons assembled in Roysland Dwyne's study via solidiphone at 2900 that evening. There were five of them at the table. Kiffer, Mardis, Taddibol, and Vanisson were actually thousands of parsecs away, on

four widely scattered bases of the fleet.

Roysland Dwyne, himself, was the fifth man.

"I'm going to make this short and sweet," Roysland said. "I don't want much discussion until you've all had a chance to mull over the data in your minds for a while."

He spent fifteen minutes telling them what he'd picked up so far. When he was finished, Vanisson asked: "Have you tried running this through a computer?"

Roysland shook his head. "It can't be done. We don't have enough symbolizable data. Only the human mind can take incomplete data and come up with the right answer, we're going to have to do this ourselves. We'll have to probe into what we have and see if we come up with anything."

"I've got a question," Mardis said. "Why does the enemy only pick on *af* ships?"

Roysland nodded. "And why do they invariably fire *immediately* after the *af* projectors fire?"

Kiffer said: "Could it be some kind of subetheric vibration that does the trick?"

"You're the subelectronics man," Roysland said. "What do you think?"

Kiffer shrugged. "Subetherics are dangerous; near a projector, they can foul up electrical currents, provided the currents aren't too strong. They can knock a man out, or even kill him; but I never heard of any effect like this."

"What would it take to get an effect like this?" Roysland asked. "Figure it from that angle."

Taddibol looked excited. "Could it be that the enemy doesn't even have such a weapon?"

They all looked at him. Roysland was grinning. "Maybe you've got the same hunch I have," Roysland said. "Let's hear it."

"We know: one, it only happens on *af* ships; two, it happens at the instant of firing. Could it be some sort of backlash from the projectors that's doing it?"

Roysland, still grinning, looked at the subelectronics man. "How about it, Kiffer?"

Kiffer shook his head. "I doubt it. There's a backwash, of course, as there is to any kind of no-spark generator. But it's almost undetectable, even with subelectronic instruments. There's certainly not enough to hurt anyone. Besides, the emission would be from the exciter in the gun, and it would hit the men in one direction; that might slow their neural currents up a little for a fraction of a second, but it wouldn't do anything like what we have here, even if it were strong enough."

All the time he had been talking, Mardis had been nodding his head in agreement. When Kiffer finished, Mardis said: "And besides that, we've tested the things, remember? We fired those projectors under every condition we could think of, and we didn't get any feedback lobotomies."

Taddibol nodded. "That's right.

We mounted four projectors on the X-69, and melted asteroids for six months before we released the weapon to the fleet."

"Anybody got any more questions?" Roysland asked.

There were none.

"All right, I have some I want you to think over. First: Is this really an enemy weapon? Second: If so, how is it generated and projected at *af* ships? Third: If it isn't an enemy weapon, what is it? Fourth: Regardless of what it is, *where* is it generated? Fifth: If we—"

He didn't finish. The solidiphone signal was blinking. He activated the instrument, and Eckisster coalesced into the room, his chubby face dewy with perspiration.

"Ah!" he said. "I'm glad to find you at home. I'm glad to see you're working on this thing at last. Why didn't you call in your staff two days ago? Maybe they can figure something out, even if you can't, this thing has suddenly become dangerous."

Roysland looked dangerous, so the general director patted the air with a hand. "I've got the stuff for you right here, Roysland, so don't give me any of your lip. In the first place, there was a convoy attack yesterday out near the periphery. It turned out to be one of the biggest battles of the war so far. The enemy lost five ships to fire from *af* projectors, and four to torpedoes. We lost two ships to torpedo fire and



six ships to the . . . what did you call it? . . . mindjammer.

"Fortunately, we had them outnumbered and were able to recover the crews and ships we'd lost to the mindjammer.

"But it doesn't look good. If they start using that weapon on a big scale, we'll be sunk. If they ever hit a planet with it— Well, you can imagine what it would be like to take care of a city full of morons."

Eckisster paused, squinted his eyes at Roysland, and jabbed at him with a finger. "Now, I've got an idea," he said. "We've got to develop some sort of screen that will take care of the mindjamming effect. You ought to be pretty good at defensive screening by now; until you worked out the *af* projector, Special Weapons has been strictly on the defensive side."

Vannison said: "Naturally, sir. It's easier to prevent something from getting to you than to figure out a way of getting to the other guy. Arms theory shows—"

Eckisster glowered at the man. "Theory, hogwash! I want a defense against the mindjammer, and I want it yesterday! Get busy!"

Roysland was leaning back in his chair with his arms folded over his chest. When Eckisster had completed his outburst, Roysland said, calmly: "Are you quite through, sir?"

"I am," said the general director. "I doubt if you mudheads can come up with anything before we are all reduced to gibbering idiots, but God knows I've done my best."



"You are finished then?" Roysland's voice was still calm. Then, quite suddenly, it became savage. "Then leave us alone, so we can think! Good-by!" He snapped off his receiver switch, and Eckister's image vanished before the director had a chance to say anything.

Roysland smiled gently. "And now, gentlemen, let's get down to work."

Two days later, the X-69—the fast, experimental ship of Special Weapons—dropped down to the Grand Port of Kandoris. A score of heavy trucks, loaded with equipment, waited for the cargo ports to open; and big, lumbering sections of construction framework were being moved in toward it.

The man who floated down the drop chute from the equatorial air lock was Kiffer Samm. A ground taxi was waiting for him, and it started to move even before Kiffer closed the door.

Within minutes, he was in Roysland Drwyn's office. He pulled up a chair, sat down, and said: "Well, I'm here."

"An astute observation," said Roysland. "Who knows to what depths of scientific thought you may reach with such cosmos-shaking revelations as that?"

"A mere nothing," said Kiffer; "I might add that the X-69 is here, too. How long will it take to get the stuff mounted on her?"

"A couple of hours. I made sure that Allerdycze would have the nec-

essary equipment ready when you landed. We'll take off as soon as she's loaded."

Kiffer frowned at Roysland, then looked down at his fingernails. "You don't need to go along."

"Why not?"

Kiffer kept looking at his nails for a full five seconds. Then he looked up and said: "Look, Roysland, suppose what you suspect is true. Suppose that it isn't an enemy weapon, but a backfire from the *af* guns. If so, then we'll be mind-jammed when we test out the fleet's weapons. And we can't afford to have you in that condition."

"I know it," said Roysland, "but there's no other way I can get the data. Besides, Billford is having some success with using microwaves on the patients; there's reason to believe that the condition is temporary."

Kiffer shrugged and spread his hands. "O.K.; if that's your orders—" He let his voice trail off. Then: "But I still don't like it. Look at it from my viewpoint; if I'm knocked out, I can depend on you to figure out a way to bring me out of it. But if you're out, too, what's to become of me?"

Roysland laughed. "That's the best reason you could have given. Thanks. But I'm still going."

It took just a little more than two hours for the Spacefleet ordnance crews to replace the *af* projectors on the X-69. Roysland's theory was simple. Although the *af* guns might be responsible for the mindjamming

effect, it was obvious that they didn't cause it every time. It was possible that there were slight differences in the backwash of radiation—slight differences caused by variations in the projectors themselves. The weapons of the *Bedevlin* and the *Killdeer* went into the turrets of the X-69; if there were any basis for the theory, at least two of those guns would be responsible for the mind-jamming effect.

The X-69 left Kandoris VI at 0500 hours, aimed herself for the vast void of the Lesser Rift, and cut in her no-space generators. The drive slammed her abruptly up past the velocity of light and into multiples thereof.

Royland had a cabin to himself near the upper deck at the nose of the ship, just beneath the control bridge. With Kiffer's aid, he set up recording instruments at various points throughout the ship, started them, and promptly forgot them. He was aboard as a human observer; the instruments had their own job to do.

Royland pushed his muscular bulk up the stair to the control bridge. Above him rose the hard, transparent dome of the ship's nose. He stood for a moment, watching the stars move slowly by. Then he walked over to where Kiffer and the ship's officers were standing, near the main control area.

"Captain Dobrin," he said, "we've got our instruments set up; we'd like to find some targets to test-fire at." He paused for a moment and

looked at the officer. "You know what we're up against, don't you?"

Captain Dobrin was a lean, gray-ing, grim-faced man who looked as though the last time he had smiled was in his mother's arms. "I know what our chances are; slightly worse than those of a fighting ship engaging the enemy, as I figure it. Besides, I figure that if you're willing to risk your neck—or your mind—I'll take the same chances with the ship." He stopped and looked at the screen, then looked straight up, pointing his finger through the transparent dome of the nose. "We'll head toward that star, there; it's a triple sun, and there's usually plenty of debris floating around in the vicinity of a system like that."

Royland watched as the ship approached the triple star system. At first it was only a bright point of light. Then, gradually, it separated into two lights, one several times as bright as the other. Finally, the brighter of the two separated into two parts. The three suns stood at the points of an elongated isosceles triangle.

As they neared the trio, the captain ordered the no-space generator cut, and the ship dropped out of drive. Instead of having a velocity measured in light-hours per second, the ship dropped suddenly to miles per second.

"Electromagnetic detectors on," said the Fire Control Officer.

A ship traveling above the velocity of light cannot detect a material body unless there is subetheric radi-

tion coming from the detected body. A star, naturally, can be detected. At those velocities, a star's sub-etheric radiation can be seen as ordinary light. But there is no way to detect a nonradiating body; in order to fire at a target, it's necessary to cut out the drive and use ordinary detectors to find a nonradiating body such as a meteorite.

"Target at forty million miles," said an observer.

"Track and fire," said the fire control officer.

The robot-controlled *af* projectors swiveled in their mounts, found the mass of nickel-iron that was their target, and hummed softly. Then they clicked.

That was all. Roysland neither saw nor felt anything unusual.

Three and a half minutes later, tawny light brought the news that the meteorite had flared in an actinic blaze of incandescent gas.

"Dead hit," said the observer.

Captain Dobrin looked at Roysland with a silent question.

Roysland nodded. "Go ahead. Let's pick out a few more; let's burn asteroids for a while."

They blasted eighteen planetoids into flaming gas in the next three hours. Roysland Dwyn and Kiffer Samon checked their instrument recordings and ran them through the differential analyzer after each firing.

"There's backwash, of course," said Kiffer. He pointed at a line that wavered up and down near the bot-

tom of the graph. "That's the background—stellar noise from the sub-electronic radiation of the nearby stars. Now"—he moved his finger along the graph—"this is the harmonic set up by the backwash at the instant of firing of the *af* projectors.

"It looks pretty high on the graph, but that's because the sub-nuclear reactions inside a star are so slight that they don't generate much background noise. Actually, the backwash from the *af*'s couldn't possibly be called dangerous."

Roysland frowned; his heavy, dark brows pulled down, wrinkling his massive forehead. "Well, they obviously didn't do anything to us. At least, if they did, I haven't noticed it."

Kiffer shrugged. "Nothing harmful, anyway. Now, here's some comparison charts I have; the test runs on *af* guns that have been installed in other ships. The wave form is identical; these guns don't react any differently than any other. As far as I can see, there's no reason for these guns to have knocked out the crews of those ships."

Roysland rubbed a finger across his chin and stared at the ceiling. That chin-rubbing gesture was significant to Kiffer; he knew Roysland well enough to know that the big man was thinking. Kiffer kept his mouth shut and waited.

Finally, Roysland snapped his fingers. "Look," he said sharply, "why aren't these things tested the way they're used?"

Kiffer looked puzzled. "The way

they're used?" He paused a moment. "Oh, I see what you mean. Why aren't they test-fired while the ship is in no-space drive? That's easy. They have to be connected up to the trackers, and the trackers can't fire at undetectable objects. And you can't detect a meteorite in no-space drive.

"Of course, I suppose we could send out some torpedoes and try to hit them, but that would be sort of wasteful."

"Then the guns aren't tested in no-space, huh?" Roysland said grinning. "Then somebody's been falsifying reports to my office."

Kiffer grinned back. "Sure," he said, "they're tested, but without the robot trackers; I don't see what difference that would make, though."

"Let's not jump to any conclusions. Those things fire in sequence when they're tracking—one right after another, in battery. And they're timed so close together that they might as well be going off all at once. Or, the time lag may have something to do with it, shoot as it is. Suppose we fire them in no-space drive, just as if it were battle conditions."

"At what?" Kiffer wanted to know. "The robot can't track unless it has a target."

"We've got targets," Roysland said quietly. "Millions of 'em."

"The Torpedoes? But—wait a minute! Millions?" Kiffer slapped his palm against his forehead. "Why didn't I think of it before? The stars, of course!"

"Right," said Roysland. "They radiate in the subetherics. But no one ever thought of firing at them before, because there's no way of telling whether you hit it or not; a star could soak up all the energy of the whole Galactic Fleet without noticing it. But we don't care whether we *hit* the target or not; all we want is a target to *fire* at."

"I'll reset the recorders," Kiffer said. "Let's see what happens."

"I'm going up to the bridge," Roysland said. "Set those gimnicks going; we want a record, even if this knocks us silly."

Up on the bridge, Roysland explained what he wanted done to Captain Dobrin.

"It can't hurt anything," Dobrin said. "We'll take a pot shot at the dwarf out there. They give a fairly small, bright target."

The ship plunged into the no-space of ultradrive as the generators were cut in, and she began to move toward a point just to one side of the dimmest of the three stars.

"Target at three fifty-two million," said the observer.

"Track and fire," said the FCO.

Roysland held his breath as the projectors moved, hummed, and clicked again. And nothing happened.

Roysland let his breath out slowly.

"Was that O.K.?" the fire control officer asked. "We can't tell whether we hit or not."

"I doubt if you could miss even a white dwarf star at this range."

Royland said. "But you're right, of course; there's no way of being *absolutely* positive." He turned back to the captain. "Let's play around with this for a while. Make a few passes, back and forth at that star and let's see what we get on the recorders."

What they got didn't look like much.

"Here's the background noise," Kiffer said, pointing at the graph. "This time, it's almost a perfect sine wave; it's the backwash from the drive generators. Here's the harmonic generated when the *af*'s go off. And here"—he pulled a strip from the differential analyzer—"are the components. This one is the container phase for the energy envelope that holds the raw violence of the beam itself. And this is the carrier wave phase."

Royland looked at the graphs and shook his head slowly. "And it all looks perfectly harmless."

"Looks, hell!" said Kiffer. "It *is* harmless. Believe me, Royland, it is definitely not the backwash from the *af* guns that's causing the mind-jammer effect. We'll have to look somewhere else."

"I guess you're right," Royland agreed reluctantly. "If it isn't here—" His voice trailed off. He was right back where he started, and he didn't have anything to go on. Finally, he reached over to the intercom and punched for the bridge. "O.K., captain," he said, "let's turn the thing around and go home!"

Two weeks after the X-69 landed at Grand Base, Royland still was stewing around, trying to make sense out of all the data he had.

Report from Bilford Vell, Chief Psychometrist: "The patients seem to be responding fairly well under the microwave treatment. It seems to act very similarly to the electro-shock treatments reputedly used centuries ago for certain types of insanity, although without the deleterious effects. The feedback loop in the prefrontal lobes is partially canceled out when the frequencies of the cerebral activities are the same as, and ninety degrees out of phase with, the microwaves beamed at the head.

"Naturally, this means that a series of treatments is necessary, since the cerebral frequencies are unpredictable and variable, and since the currents in the feedback loop are composed of a number of different frequencies."

Fine, thought Royland. *There's some hope, at least. We know what can cure it, but what can cause it?*

Report from Allerdyc Blyt, CinC, Galactic Fleet: "I don't know what you can make out of this, but maybe you can get together with Bilford and figure out what it means. If you ask me, I think the Enlissa have gone nuts. Is it possible there's a backwash from their mindjammer?"

"Anyway, here's what's happened.

"During a minor skirmish near the Alavard Cluster, two Enlissa ships came in on attack geodesics toward the GSS *Vivid*. The *Vivid* is

not equipped with *af* projectors, so they had to rely on conventional torpedoes. Since the odds were two to one, they had little hope of surviving, but they had hopes of inflicting some damage on the enemy. So they waited until the Enlissa ships were well within range, and fired.

"The Enlissa ships took no evasive action, and the torpedoes destroyed both ships. There was no need for the *Vrowl* to use evasive action, since the enemy ships *did not fire a single torpedo!*

"There have been other instances of similar action.

"In other small skirmishes, the *af* guns have proven their effectiveness; they've shot up Enlissa ships before they were in torpedo range. Oddly enough, no human ship equipped with *af*'s has ever been hit by a torpedo."

Roysland went back and reread one of the sentences. "Is it possible there's a backwash from their mindjammer?"

It's possible, sure. Until we know what the mindjammer is, we'll have to admit that anything's possible.

Report from Kaffer Samun: "I've done the checking you suggested. There is a definite effect on the brain, but it isn't permanent, nor noticeable. The backwash of the *af* guns causes a slight retardation of nerve impulses. But it isn't enough to cause any reaction—either mental or physiological. It doesn't last enough, in the first place; and it isn't powerful enough, in the second. I don't know what would happen

if a person were subjected to such a field over a long period of time, but the situation corrects itself so rapidly that there is no danger of cumulative effects.

"Besides, some of the men affected have never been exposed to the backwash from *af* fire before, while others have been exposed a good many times. If the thing were cumulative, we would have men being knocked out here and there, at random, as the accumulation built up⁶—and it just ain't so.

"The only parallel I can make—as far as long-range effects are concerned—are the effects of the backwash from the drive itself. And that isn't bad at all. Statistically speaking, the crews of spaceships are more alert, and have more interest in their surroundings, *after* long periods of service than they have before exposure. Even so, that is probably due to military work and periodic psychological checkups, rather than to any effect of the field.

"Do you have any other ideas?"

Roysland looked sourly at the report. *Ideas? Sure; I've got all kinds of ideas. I wish I had an answer.*

Report from General Director Eckisster—delivered via solidiphone:

"Roysland, you're going to have to start moving, here!" The director shifted his heavy bulk in his chair and glowered at Roysland Dwyn. "As far as I can tell, you haven't done a blasted thing! Of all the meaningless reports I ever read, these are the epitome of nonsense."

He waved a chubby hand at a pile of papers in his lap. "As I understand it, you've been looking for some sort of effect emanating from our own weapons instead of from the enemy's.

"Now, to me, that's as silly as a man with a sword trying to explain away the stab wound in his belly by claiming that something happened during the fight and the hilt stabbed him. Or a man with a bullet wound trying to claim it was caused by the recoil of his blunderbuss!"

Royland tapped his fingers softly on the top of his huge black desk until Eckister was through, then he said: "It's the only hypothesis that fits the facts. I'll admit that we haven't been able to prove anything yet, but I'm convinced that—"

He was interrupted by the chiming of the solidiphone. He cut in a second circuit, and Fleet Commander Allerdyc coalesced in the air next to Eckister. He glanced at the general director.

"Good afternoon, Eckister." Then he looked back at Royland. "I've got your weapon for you. Forty hours ago, Squadron H-177 met the enemy near St. Jaius' Cluster. We won the battle by a small margin, but that's neither here nor there. The important thing right now is what the hospital and salvage ships found when they came in after the battle. All the data isn't in yet, but as near as we can tell so far, a freak accident occurred.

"One of our ships was surprised by an Enlissa ship that came in out

of a nearby sun; the enemy ship actually snapped by at less than a hundred miles. A lucky shot hit the drive generators of the enemy ship, and it stopped almost dead in space.

"They managed to get the crew of our own ship with their mind-jammer, but something happened aboard the enemy ship, too. Evidently the weapon does have a backwash; the enemy crew was mindjammed, too!"

Royland and Eckister both started to say something, but the commander raised his hand. "Wait a second! The point I'm getting at is this: The Enlissa ship was recovered intact; the mindjammer projectors are aboard! I've sent an emergency order to the squadron commander in that sector; the Enlissa ship will be here tomorrow morning. We'll hold it sealed until you and your crew can investigate. The inspectors will have to go in with you, of course, but you'll be in charge of the weapons themselves."

He stopped and stared Eckister with a frosty look. "I trust that meets with your approval, Eckister?"

The general director was beaming seraphically. "It does, commander; indeed it does. Thank you. Thank you, so much."

Allerdyc glowered. "I'll be available in a couple of hours. Right now, I've got to get some work done." He cut the circuit.

Eckister turned his beaming visage from the dissolving image of

Allerdyce to the blocky figure of Roysland.

"May I suggest that you try investigating what few facts the fleet may have turned up? Who knows—you may find them profitable, eh? Or perhaps you're too busy trying to figure out how the *af* guns work to have any time for the enemy's mindjammer?"

"However that may be, I'll leave you to your work, bumblehead."

Roysland shot to his feet. "Good! Maybe I could get some work done, myself, if you weren't around needling me!" He reached out to snap off the solidiphone switch, but Eckisster, still smiling benevolently, was already fading. Roysland got the impression that his smile, Chesh-irdlike, still lingered after he had gone.

The crew of the Enlissa ship were the first live aliens ever seen by human beings. Their corpses had been dissected by the thousands, but the living organism had never been investigated before.

"This gives us a jump on them," one of the biologists said. "As far as we know, no living human has ever been caught by the Enlissa."

Roysland, who was watching the aliens being herded out of the captured ship, turned his head to look at the biologist. "They don't know we've got this ship, either," he said.

The biologist blinked, then nodded. "Yeah. I see what you mean."

They were standing on the broad spread of plastalloy that covered the great landing field of Grand Base, standing in the shadow of the huge alien ship. The Psych men were pushing the Enlissa out of the ship, through the path formed by the Inspection Corps men and Roysland's own Special Weapons Group of the Research Division. The Psych men simply pushed them into the drop chutes from the ship. Other Psych men kept them moving toward the trucks that were taking them away.

The Enlissa weren't quite as tall, on the average, as a human being. The skeletal structure was a little heavier, and the section corresponding to the human rib cage was a series of armor plates that completely enclosed the viscera. The pale blue-violet of their skins came from the cobalt-protein complex that carried the oxygen through their blood, performing the same function that hemoglobin does in the human animal.

They were noseless; breathing was done through the mouth. The teeth were widely spaced, and the lips could not close over them, thus allowing the Enlissa to breathe, even when unconscious. The eyes were a solid black. It was impossible to tell, from a superficial inspection, where the deeply-pigmented surface of the eyeball ended and the dead black of the lens opening began. They were somewhat larger than human eyes, but they were set in front of the skull, allowing stereoscopic vision.



Their protective covering might have been called hair, by stretching the definition somewhat. By an equal amount of stretching, it could have been called fingernails or scales. It would have taken an awful lot of stretching to call it feathers.

The "hair" consisted of ribbons of thin chitinlike material. The ribbons weren't much thicker than human hair, but they were nearly a sixteenth of an inch in width, and ranged in color from a glossy black to a royal blue, depending on the individual.

The feet were splayed, almost

radial; the hands were four-digitated—double thumbed and double fingered.

The clothing they wore, though radically cut, was analogous to the styles worn by human beings.

Roydland waited until the aliens were herded out of the ship. They had to be prodded like beasts, since there was no way to talk to them. No exchange of language had ever been achieved; but, like their human counterparts, the mindjammed Enliss seemed to be perfectly willing to obey any exterior commands.

"What?" said Roysland. He had been so engrossed in his own thoughts that he had only dimly realized that Kiffer Samm was talking to him.

"I said that we'll have to check on them, too, after we see what this weapon is all about."

Roysland folded his hands and rubbed his thumbs together. "Maybe before."

"Huh?"

"Never mind," Roysland said. "Here come the last of them. We want to get all the samples out of their supplies that we can, and we've already been promised first look at those projectors the *Enlissa* have on board the ship. Come on; let's take a look."

The *Enlissa* ship wasn't organized too differently from the human version. On the surface, things looked odd; but the laws of the universe function the same way in all places, so the internal workings of the ship were essentially similar.

The Special Weapons men went through the ship with the men of the Inspection Division, photographing, tracing circuits, analyzing, checking differences, and organizing similarities.

Roysland and Kiffer spent most of their time with the big, complex projectors that were cradled in the hull blisters.

When Kiffer first saw them, he turned to Roysland and tried to keep from looking bewildered. "They're subelectronic projectors of some kind. But *what* kind?"

"That's what we've got to find out," Roysland told him. "We'll have to find out what they do on a physical level first. From there, we'll go on to the physiological level, then we may—just may—be able to go on to the psychological effects."

Kiffer Samm looked up at the great frame of his superior, and grinned sardonically. "O.K. Now we've got the effect and the weapon that causes it. Can we correlate the two?"

Roysland shrugged his broad shoulders. "Sure we can. But how long will it take us?"

The laws of the universe may not differ from place to place, but the methods of using them do; and the particular laws that may be discovered in one place aren't necessarily the same ones that are discovered in another. No two human beings think alike; two different evolutionary branches of intelligence, stemming from totally different beginnings, certainly can't be expected to reason similarly. The amazing thing about the *Enlissa* was not the ways in which they differed from humanity, but the ways in which they were similar.

So it wasn't to be wondered at that the Special Weapons technicians couldn't figure out for the life of them what the projectors from the *Enlissa* ship did, or why they worked. If they had been the type of men to be stymied by seemingly-unbreakable barriers, they would

have gone off their collective rockers in the first three weeks.

One by one, Roysland Dwyn called in the best analysts from every sector of the human-controlled galaxy. And slowly the information began to build up.

The first firing test of the enemy weapon was conducted on Syndor, the outermost and smaller of the two satellites of Kandoris VI. Roysland had the thing taken to the subnucleonics lab there because he felt that there was no need to subject the population of Kandoris to any danger from the backwash—if any. And only God knew how much territory the effective field might cover.

The Special Weapons group had dismantled one of the projectors from the ship and loaded it carefully on the X-69, along with the Enlizza-built generator that powered it.

On Syndor, Roysland watched the unloading. He stood on the broad, airless stretch of the landing field and watched the grapples lower the big, tubular weapon to the deck of the field. The blue-white glare of the distant sun splashed off the metallic sides of the ship, forcing Roysland to narrow his eyes, in spite of the heavy polarized filter in the helmet of his spacesuit.

The thing floated down under the control of the grapple beams until it was only a few feet from the surface.

Roysland heard the voice of the crew leader bellow in his earphones. "O.K., watch it! Get the truck un-

demeath that thing before you drop it any more!"

A sturdy six-wheeled truck was moved in under the projector. The grapple operator turned a rheostat, and the projector sank another six inches, to rest on the truck.

"O.K.!" yelled the crew leader. "Haul her away!"

The truck trundled off in the direction of the Llondis Mountains.

Kiffer's voice came through Roysland's phones. "Let's go, Roysland; I'm right behind you."

Roysland turned around. Kiffer Samm was sitting in the driver's seat of a small jeep.

As he climbed in, Roysland said, "I felt the vibration as you pulled up, but I didn't pay any attention to it. Coming up behind a guy like that is real sneaky."

Kiffer's chuckle coincided with the slight vibration of the jeep as it started moving after the six-wheeler.

The testing area was some miles from the permanent labs. Roysland wanted to test the weapon by firing at Kandoris herself. The huge blue-white sun could certainly take anything directed at her.

It took the better part of three days to set up the site for the test, and during most of that time, Roysland Dwyn was in a spacesuit. The construction engineers had rigged up a plastic shell for dormitories and other inside necessities, but the work had to be done in the vacuum of space. By the time the set-up had been completed, Roysland felt ex-

hausted in every muscle of his huge body. On the "afternoon" of the third day, he peeled off his oversize spacesuit and lay back on his cot. It was much too short for him, and his feet stuck out over the edge; but he was too tired to worry about that.

Kiffer was sitting on his own bunk, massaging his neck to get the kinks out. "The thing that bothers me," he said, "is the eternal sunlight. That blasted star won't go down for another seventy days."

Royland nodded, but it was obvious that his mind was elsewhere.

"Suppose there is a backwash from this thing," Royland said at last. "That would account for a lot of things. We've been wondering why the *Enlissa* ships didn't loot our own vessels after they used the mindjammer."

"Certainly," Kiffer said. "It's obvious. Their own weapon backfired on them, and left the *Enlissa* ship incapable of doing any looting. I figured that out a long time ago."

"Oh, did you?" asked Royland smoothly. "Then did you figure out why the *Enlissa* didn't test the thing before they used it?"

Kiffer shrugged. "Who knows? What do I know about alien psychology?"

"You don't have to know anything about psychology of any kind; all you have to know is a common, ordinary law of species survival. Any race that takes a weapon into battle without testing it thoroughly, doesn't survive very long."

Kiffer ran the tips of his fingers across his lower lips. "True; but maybe they were suicide squads—or maybe they have a hospital ship following them to pick them up and cure them. After all, Bilford has this cure of his working pretty well now; if the *Enlissa* invented this thing, they probably know how to counter its effects.

"Besides, you didn't think we'd tested the *aj* guns thoroughly. And we're still surviving."

Royland turned to look at Kiffer, and his face was definitely smothering. "Kiffer, there are times when your thinking has all the clarity and lucidness of a hunk of obsidian.

"There's a difference between the luck of testing of the *aj* gun and the *Enlissa*'s not thoroughly testing the mindjammer. There's a difference between looking for something you could logically expect and not finding something that you don't even suspect the existence of."

Kiffer nodded. "Sure; I see what you mean. But that simply means that they don't have any way of shielding the effect—so they have a hospital ship trailing them."

Royland lay back again and closed his eyes. "Obsidian," he said. Then, after a moment, "One: Why do they sacrifice a crew—even if it's only for a short time? Two: Why don't they use such an efficient weapon against ships that blast them out of the sky? Three: Why do they come in at a ship without firing anything at all?"

"Until your hypothesis answers

all of those questions—and a lot more besides—it isn't worth a damn."

Kiffer chewed at his upper lip and then looked at his wrist watch. "If you're going to test that thing in an hour, you'd better call Eckisster now."

Roysland sighed deeply. "O.K.; I'll call Old Nasty. Give me a minute to brace myself."

He didn't take the minute; he didn't really need it. He walked over to the solidiphone and punched in the code numbers. Three seconds later, General Director Eckisster was sitting in the middle of the room.

"You're ready, eh? All right; go ahead," he said. "Find out what you can—if anything. I have no further instructions—just don't get yourself killed while you're working."

The heavy space boot that came from Roysland's hand sailed through the image just as it was dissolving. Eckisster had cut off without waiting for Roysland's answer.

"One of these days," Kiffer said, "you're going to be in his office, and you'll forget it isn't a solidograph image and let go with a boot, or something, and knock the boss' teeth in."

Roysland shook his head emphatically as he walked over to pick up the boot. "Nope. If he's actually there in person, I'm going to have a poisoned needle to jab into him. I'll show him how to needle people!"

The Enlissa weapon was fired at

Kandoris at 30:00 hours. Spaceships posted along the long line of fire between the satellite of Kandoris VI and the sun itself had sent out instrument-filled drones in the path of the beam to check the beam frequency. The time required for the subetheric wave to travel the eight hundred million miles from the planetary orbit to primary was too short to be measured. As far as the recording instruments were concerned, the beam was instantaneous.

The projector itself was fired by remote control; there were no personnel within three miles of the Enlissa projector when it went off.

The resultant recordings were run through the differential analyzers, and the final graphs were delivered to Kiffer Samm.

After four hours of working with the data, Kiffer made his report to Roysland.

"It's an odd wave length," he said. "Actually, it's a harmonic of three different basic frequencies. Look here: the thing is definitely frequency modulated, but it's a comparatively simple thing." He ran his finger along the primary recordings. "The thing wouldn't really have to be run through the differentials; it could be figured out with a slipdisk.

"The thing that makes it different is the extremely short wave length. The longest of the three has a wave length of eighty thousand kilometers, and the shortest is forty-two thousand kilometers. In a subetheric beam, that's the equivalent of hard

X-rays—damned high frequency."

Royland looked at the recordings carefully. "Is there any reason why this particular wave length should have any effect on the human brain?"

Kiffer looked at the graphs for a long time. When he finally looked up, he said: "I don't know for sure; mind if I call Balford?"

Royland shook his great head. "Go ahead; I don't mind."

When Balford's image flickered into existence, Royland kept his mouth shut while Kiffer showed the psychometrist the recordings of the energy from the Enlissa projector.

Bilford listened and looked and frowned. "The recordings actually don't make sense to me," he admitted. "I'm a psychometrist, not a subelectronocist."

"If you could translate those recordings from subetheric to their electromagnetic equivalents, I might be able to make something out of it."

The conversion didn't take long, all Kiffer had to do was run the stuff through the analyzer and punch in a correction factor.

Bilford stared at the corrected graphs and compared them with tracings of his own.

"I don't see any correlation," he said at last. "This may take a bit of work. There may be multiple harmonics of the basic stuff involved, of course; but frankly I can't see that the subetherics have anything in common with the electromagnetics as far as this area is concerned."

For the first time, Royland spoke. "Try a combination-permutation synthesis. See what you get—O K.?"

Bilford nodded in agreement. "I'll try it—all the different wave lengths involved, plus the subetheric velocity factor. If I come up with anything, I'll let you know."

"Good enough," said Royland.

The solidiphone image of General Director Eckister stood in the center of the room. He looked around and then focused his gaze on Royland Dwyn. "Listen here, Royland," he said belligerently. "why haven't you done anything? What's the situation now?"

Royland looked at the general director and put on his nastiest grin. "You've got the report; we haven't done anything. We've fired the Enlissa projector six times. There is only a residual backwash that is harmless. You could fire the thing in your living room if you wanted to. Meanwhile, we want to know what the effect of the beam is."

"And why, may I ask," said Eckister, "can't you determine so simple a thing as that? This request is utter and absolute nonsense!" He slapped at the papers he held in his hand.

"I knew you'd like that," Royland said. "I thought maybe you could suggest something else. I can't."

"As I understand it," Eckister said testily, "you want a human volunteer to test the Enlissa mind-jammer on."

"That's right," Royland said.

"So far, all we've proven is that the backwash from the projector has no effect on humans or animals; but we don't know what happens to a man who's hit by the beam itself."

"Oh? We don't? I rather assumed that the fleet hospital's psychiatric wards were full of men who have been hit by the beam."

"An unjustified assumption," Roysland snapped. "At least, so far, it's unprovable. The point is: Do I or don't I have your permission to ask for a volunteer?"

"Why can't you use test animals?" Eckister asked.

"If you'd bother to read the reports I send you, you'd know. We have used 'em. The beam didn't touch 'em. We sprayed one group for half an hour; and as far as anyone can tell, we might just as well have been shining a flashlight on them."

"Of course," Eckister said. "The mindjammer causes a feedback loop in the prefrontal lobes. What do you expect it to do to animals with no prefrontal lobe?"

"My point exactly," Roysland agreed. He knew perfectly well that Eckister had read the report completely and thoroughly. His pretended ignorance and snide remarks were just a mechanism he used for purposes of his own.

"The question is," Roysland repeated, "do I have your permission to ask for a volunteer?"

"I checked with Billford," the general director said. "He's getting

the microwave technique worked out fairly well now; he says he can bring a man around in twenty-five to thirty days." He stopped and looked at Roysland closely. "Go ahead and ask for volunteers."

"Thanks," said Roysland.

Eckister nodded as he dissolved.

Roysland reached over and punched a button. "Where's Kiffer?" he asked.

"Eating at the mess hall, right now," said a voice.

"That's what I thought. Will you have him come here, to my place, as soon as he gets through? Say, in half an hour?"

"I'll tell him."

"Fine," Roysland lifted his finger and turned to the typer on his desk. He wasn't used to the makeshift office, and he found himself wishing he was back on Kandoris VI, in his own office.

He shrugged and began running his fingers over the typer. It took him only a few minutes to put down what he wanted to say. When he finished, he pulled the sheet from the printer tank and put it on his desk, in plain sight. At the top, he scrawled: "To Kiffer Samm." His own signature went at the bottom.

Then he put on his spacesuit and headed out, toward the outside air lock.

Half an hour later, Kiffer Samm was reading the note. He had stepped into Roysland's office and seen that it was empty. Assuming that his superior would be right back, he

had sat down to wait. Then he'd seen the note.

He was halfway through it before it became perfectly clear what Roysland was doing.

". . . So you may have to take over for the next twenty-five to thirty days. Naturally, I couldn't ask anyone else to take the risk.

"I think it may be a good idea if Bilford starts experimenting with subetherics in an effort to snap the rest of the boys out of this feedback loop thing. Maybe he can do it in less time.

"By the time you read this and get in a spacesuit and get out to the firing area, I will have finished the test; don't let me die of starvation, chum."

Kiffer punched at the communicator button, yelled orders into it, and grabbed a spacesuit out of the locker. By the time he reached the outer air lock, a jeep was waiting for him.

When the second jeep pulled up, Kiffer said: "You men stop at the gun emplacement and take a look at the weapon. We'll go on to the target tower and pick up Roysland."

The men nodded their agreement, and the two vehicles started rolling.

Theoretically, it was "evening," but the great, blue-white blaze of Kandoris still hung in the eternally black sky. The jeep went by the gun emplacement where the Enlissa weapon had been set up for testing. Kiffer noticed that the snout of the ugly-looking tube was aimed at the squat steel tower where the animal

subjects had been exposed to its radiations.

"There he is!" said the jeep's driver, pointing.

Kiffer could see a spacesuited figure on the target tower. He twisted the dial on his chest and said to the men in the second jeep: "Check that projector! Make sure it isn't in operation!"

"It's not," said one of the men. "He had a timer connected to the firing mechanism. He got a ten-second burst from it, according to the timer reading."

"Thanks. We'll pick him up, then."

The jeep swerved toward the tower and pulled up underneath it in a swirl of dust that settled slowly and evenly in the low gravity of the airless satellite. Kiffer jumped out of the jeep, grabbed the rungs of the ladder, and lifted himself to the platform at the top of the twenty-foot tower.

He stuck his head up over the edge and saw Roysland. The man was sitting on a small chair with his back to the ladder. Surrounding him were the various recording instruments that had been rigged up on the platform for testing the animals and the effects of the beam on them.

Kiffer climbed on up and twisted his helmet phone control to Roysland's frequency. As he put his hand on Roysland's shoulder, he said: "Stand up, Roysland."

Roysland jerked around. "What? Oh. Hi, Kiffer; I saw you coming

in the jeep." He paused then, and though Kiffer couldn't see very well through the heavy darkness of the helmet's glare-filtering polarization, he could have sworn that Roysland was grinning. He would have been right.

"Oh, I get it," Roysland said. "You were expecting to find me sitting up here with a feedback lobotomy. Frankly, so was I, a half hour or so ago, but I'd almost forgotten it."

Kiffer took a deep breath, let it out, and said a few choice, pungent words, "... Who would scare a guy like that," he ended.

"Sorry," Roysland said, still grinning. But take a look at these readings, I think you'll—"

"Wait a minute!" Kiffer interrupted. "I'm not interested in meter readings right now! What happened or didn't happen to you?"

"Is he all right?"

"What's going on up there?"

"Need any help?"

The voices came almost simultaneously to Kiffer's phones. He could see the second jeep tearing up dust between the gun emplacement and the target tower.

"He's O.K.," Kiffer snapped. "Big false alarm! I think we ought to have an explanation."

The answering burst of catcalling and jeers made Roysland wince. "O.K., fellers! O.K.! Please accept my abject and snivelling apologies."

"Explain yourself," Kiffer said in a monarchical tone. "You were supposed to be out here testing this



thing on yourself; you wrote a very heart-rending note to that effect. I don't blame you for getting cold feet, but you could at least have notified us."

"I didn't get cold feet," Roysland said. "Look at the cerebograph reading and compare it with the firing record."

Kiffer looked and then said: "Then you *did* take it? But according to this, all it did was cause a very faint *petit mal* convulsion. You probably didn't even notice it."

"I didn't," Roysland said. "I don't know what that projector is supposed to do, but it sure isn't a mindjammer!"

Kiffer looked again at the records. "Maybe you weren't far enough away from the projector," he said doubtfully. "Maybe the distance—"

"Impossible," said Roysland. "The beam doesn't disperse appreciably over a distance of half a light-year; you know that. And the wave form is exactly the same."

"No, I'm afraid we've just run up against another blind alley."

Kiffer shook his head slowly. "I don't believe it," he said. "The Enlissa didn't have their ship armed with this thing for nothing. We must have connected it up wrong, somehow."

"Maybe," Roysland said. "But it doesn't work as is. Let's get these records into the jeep; I want to see what we're getting here, anyway."

They took the recordings out of the instruments and dropped them

to the three men who were waiting by the jeeps parked underneath the tower.

A few minutes later, they were heading back toward the dome.

Four days later, Roysland was back on Kändoris VI, exalted firmly in his office. Kiffer Samm stayed on Syndor, still working on the Enlissa projector.

The first thing Roysland did was to call another staff meeting. He also included Bilford and Commander Allerdyce.

He outlined briefly the data they had so far on the Enlissa mindjammer, then asked for comments.

Bilford grabbed the floor first. "I did the correlation you wanted, and I came up with some answers, but they're not the right ones as far as I can tell."

"As far as the backwash on the *af* gun is concerned, I think you can rule that out. After converting to electromagnetic equivalents, I find that the frequency of the backwash is much too low to have any effect on the brain. That is, assuming that subetherics have any effect on the mind at all—and, of course, assuming that there is any analogy at all between the function of sub-etheric vibrations and electromagnetic vibrations. After all, analogue reasoning has its limitations, too, just as logical reasoning does."

"The captured Enlissa projector is another problem. Unlike the *af*'s backwash, it isn't a noise; it's a definite, although complex, tone I say

complex because—and again my reasoning is analogical—because the frequency is not a pure sine wave, but a combination. It's analogous to the difference between the vibration of a tuning fork sounding middle C and, say, a violin sounding the same note.

"Even so, I think we can say that the captured projector is *not* the mindjammer; the frequency is much too high. It's on the order of hard X-rays. If the analogy holds, the subetheric beam should be capable of disrupting certain molecules, but it most certainly couldn't have the mindjamming effect on the human brain."

He sat down and rubbed his hands together nervously.

Commander Allerdycce stood up. Normally, the fleet commander did not kowtow to anyone, but his automatic respect for the big man in the chair at the head of the table came to the fore. As a matter of fact, the commander didn't think of it as kowtowing; he merely acknowledged the superior abilities of the man he was facing.

"All I've got is statistics, Roysland. I wouldn't have noticed it without your hint, but we've worked out a new strategy that has reduced casualties by better than sixty per cent." He reached down and picked up a pile of report sheets.

"It stacks up this way: About thirty per cent of the Enlissa ships that attack have the habit of coming in without firing anything. What the reason is, I don't know, but they

do it. Therefore, we have a good chance of getting the enemy with torpedoes alone if he doesn't fire first.

"A ship equipped with *aj* projectors has about a seventy per cent chance of winning. The other thirty-odd per cent of the time, they're mindjammed.

"The chances of a conventionally armed ship coming through is better than sixty-two per cent.

"But here's the gimmick: In taking the action of the Enlissa fleet into account, we can reduce the casualties tremendously. About thirty-two per cent of them come in without firing. By taking that into account, we can increase our own chances of survival tremendously."

Roysland nodded. "Good; I'd like to see the statistics on that. Would you mind sending over the full report?"

"Not at all," said Commander Allerdycce. He sat down.

Taddibol stood. "I think I can speak for Vanisson, Mardis, and myself. According to the evidence we have, the Enlissa are capable of picking out a ship with *aj* guns *before* they fire. We think that there must be some residual emanation from the *aj* that is detectable by the enemy. No other hypothesis fits the facts."

Vanisson was standing before Taddibol had finished. "I'd like to make it clear that, although I agree with Taddibol Vlys, the evidence is still a necessary part of the hypothesis. We've—"

The emergency buzzer sounded, and everyone at the table turned to look at Roysland as he swore roundly and jabbed the stud. General Director Eckisster had barely begun to solidify before Roysland said: "Can't I have any peace? Must you continually and forever be looking over my shoulder?"

"No," said Eckisster calmly. "Yes. If that answers your questions, may I say something? I'm sorry I had to interrupt a staff meeting, but I felt that this would be the perfect time to inject this bit of data.

"As I see it, you weren't satisfied with human volunteers for the Enlissa weapon; you asked that two of the aliens also be subjected to the beam from their own gun."

"That's right," Roysland said. "According to Bilford, two of them have been rendered sane by the treatment of the microwave frequencies. I didn't think you'd reject using the Enlissa captives on humanitarian grounds."

"I didn't," Eckisster said. "Your man, Kiffer, claimed that further information could be gained by subjecting the alien brains of the enemy to the radiation from their own projector. Since the psychological department has now discovered a method of bringing back the functional ability of the brain after exposure to the mindjammer effect, I didn't think it would be harmful to allow two of the aliens to be subjected to it again. Unfortunately, they died."

"They *what*?" Bilford shouted the question.

"Died, Bilford, *died*," Eckisster said. "They are both as dead as the surface of Syndor."

"Good God!" Bilford said. "Perhaps a second exposure—" Suddenly he jammed a finger down on his cut-off, and his image vanished from the conference room.

"What was the reason for that?" Eckisster wanted to know.

"He's just released the first batch of men from the hospital for active duty," said Fleet Commander Alledyce. "If that thing *is* the mindjammer, and those men are exposed again— Excuse me." His own finger touched the cutoff, and his image flickered out.

Eckisster looked at Roysland. "Well, sir?"

Roysland shook his head. "I didn't expect that," he said. "I honestly didn't expect that."

"I know you didn't," Eckisster said softly. "I know you didn't. But look at it this way: It's data. And we need data."

"I know," Roysland said. "It's not that. Excuse me; I've got to think." He slammed his hand down, and the whole group collapsed into nothingness.

"*What*?" asked Commander Alledyce.

"I said," Roysland repeated, "that I think I have the answer to something that was brought up in the meeting last night. And I want you

to give me permission to take the X-69 into enemy territory."

"I will," Allerdycce said, "if you'll give me a good reason for going."

"All I want is a sample of alien animal life. I think I know what's going on, but I'm not sure."

"Allerdycce shook his head. "We can't do it. We don't know where the enemy bases are, any more than the Enlissa know where our own planets are. We keep our subetheric devices shielded, and so do they. If we didn't, this would have ceased to be a spatial war long ago—you know that."

"I know," Roysland admitted; "but we have prisoners; members of the enemy's armed forces. We can get our information from them."

Allerdycce was still shaking his head. "How? They've been treated mentally against probing. They won't tell us where their home planets are, any more than our own men would—or *could*—tell them."

Roysland, in turn, shook his head. "That's not what I'm looking for. I'm not a military man; I'm a scientist—at least I think I am. I'm not looking for military bases; I'm looking for a planet where the Enlissa have planted their flora and fauna. That's what we do with a planet, isn't it? Seed it long before we colonize. If they've done as much colonization as we have—and their war potential shows that they must have—then they'll have a lot of planets that aren't inhabited by the Enlissa themselves, but will have been seeded by Enlissa-type life.

"At least one of the crewmen from that ship will know where such a planet is located. And I'm willing to bet that he won't be conditioned against telling us."

"Why not?" Allerdycce asked.

"For the same reason you haven't thought of it," Roysland said, grinning. "The Colonization Service and the Fleet Command are two different branches. Unless the aliens think differently than we do, their organization is about the same. And every bit of evidence shows that their reasoning is similar.

"There's no reason to protect an unpopulated planet, is there? Besides, the military don't inspect colonization records. Why should they? And what would it matter if the enemy took over an unpopulated planet? After all, we have as much chance of taking over one of theirs."

Allerdycce thought it over before answering. Finally, he said: "I'll check with Bilford. If he thinks we can get that much information out of an alien, I'll O.K. the trip. I'll have to insist, of course, that the X-69 be fully armed and subject to military orders."

"Naturally," Roysland agreed. "Just let me make the trip; that's all."

"I'll see what I can do," said Allerdycce. "Meanwhile, I'm going to call Colonization Service."

Roysland smiled to himself as he cut the connection.

Three days after that, the X-69 lifted again for space. On board her,

locked securely in the brig, was the first officer of the captured Enlissa vessel.

No one had yet determined the nature of the Enlissa language, but Bilford had worked out a method of getting yes-no answers out of him, and had, by the process of elimination, arrived at a star system that contained a planet which had been seeded by the aliens. And all Roysland wanted was a sample of the Enlissa animals.

There's an old saying which goes: "Some people have all the luck." It has echoed down the corridors of human history and human thought for a thousand centuries, in one form or another. It is usually assumed to be the complaint of the unsuccessful against those whose success is greater—but it is to be noted that it is not specified whether the luck is good or bad.

With the same reservations, one might assume that Roysland Dwyn was lucky. On the fourth day out, the alarm buzzers sang their warning through the corridors of the X-69.

As the crew scrambled for battle stations, Roysland headed up the stairway toward the control bridge. Captain Dobrin and the fire control officer were huddled over the spotter-scope, conversing in low tones. Roysland walked over behind them, but he kept his mouth shut. In a situation like this, he was only a civilian; it wasn't his business to say anything now. He studied the instruments, instead.

Somewhere out near the limits of

the detector's range had come the faint trace of a moving ship. And the identity comparator showed it to be an Enlissa vessel.

"She must have picked us up, too," said the captain. "We'll know in a few minutes."

They watched quietly, tensely, waiting for the Enlissa ship to change course. If it didn't, a battleship would normally change the geodesic of its own flight and follow to engage the Enlissa ship. But not the X-69; she was looking for planets, not ships.

They didn't have to wait long. A few minutes later, a trace appeared in the same octant of the scope where the earlier trace had vanished.

"Same ship, all right," said the FCO. "It would take them that long to turn around. They're going to try to come in for a kill."

"Signal Final Alert," said the captain.

As the buzzer sizzled out its message, Roysland flexed his muscles in a subconscious desire for action.

Captain Dobrin seemed to realize for the first time that Roysland was in the control room. His face was hard and tightly drawn, and only very slightly showed the strain that was beneath.

"We're going to operate according to the new tactics," he said. "We'll use the torpedoes first and the *af* guns last. We'll use screen-busters and files."

Roysland nodded. "You're in command here, captain. I know nothing of spatial strategy."

The prime officer turned back to the FCO. "Check maximum volume and englobe. It'll be expensive, but we can't afford to take chances now."

"Yes, sir," said the fire control officer.

Royland watched the instruments closely as the FCO gave his orders. The first job was to feed into the calculators the exact course and velocity of the enemy ship. Then they waited until the calculators gave the most probable volume of space that the ship would occupy after the screenbuster torpedoes were sent.

Take a solution to the Brownian Movement problem; add everything that is known about spatial strategy; stir well with the enemy's probable interpretation of the signals from the torpedoes—and hope like hell.

The first ingredient is relatively easy to determine, the second very much less so, and the third is almost pure intuition.

Figures began to pop up on the screen. The FCO watched them, unmoving, his face a rigid mask. Then suddenly, he began to punch data into the torpedo-firing robots.

Royland narrowed his eyes as he watched. The *af* projectors didn't require that much computation. If the *af*'s were fired now, the *Enlissa* ship wouldn't have a chance to fire. And yet, statistics showed that—

W'hy?

The FCO's masklike face began to acquire a sheen of perspiration in the glowing lights of the control room as he watched the screen and punched methodically at the fire

control board. It was work that no robot could do; it required the shrewdness, intuition, and foresightedness that is a peculiar quality of the human mind.

Without warning, the FCO jabbed violently at the white stud that stood at the edge of his panel. He jerked his finger off, and his hand seemed to freeze for a second. He had done the irrevocable; he had fired every torpedo in the ship.

The X-69 now possessed no armament except the *af* guns.

The first volley of screenbusters left the ship and slammed suddenly into the ultravelocity that only an unmanned torpedo is capable of. Even an antiaacceleration field isn't one hundred per cent perfect. In no-space drive, a ship can accelerate at the spatial equivalent of better than a hundred thousand gravities without hurting the crew. But the tremendous acceleration of a war torpedo would crush any human body to a monomolecular film.

The torpedoes had to be small; only a very small no-space generator could achieve such velocities in so short a time. But their small capacity was capable of carrying enough sub-nuclear explosive to smash through the energy screens of the enemy ship.

They could not, however, breach the veldium hull itself or kill personnel within. That was where the "flies" came in. Their job was to smash through the breach in the energy screen, open the hull, and destroy life within.

The only trouble was that the enemy could detect the torpedoes. If the *Endissa* could act fast enough, they might be able to avoid them. The hope of the human ship was that the englobement would be too much for the robot computers of the *Endissa*.

The first wave of torpedoes left the X-69, spearing in the general direction of the *Endissa* vessel. For a fraction of a second, they maintained their original course. Then they became erratic—purposely so.



They flashed on and off in the detector screens as their no-space generators cut in and out, and they switched courses with dizzying rapidity. They had been on their way only for hundredths of a second when the second volley let go. Then the third blasted out. The whole thing was over before an eyelid could flicker.

Roysland glanced at the chronometer; the whole operation had taken slightly over ninety seconds.

The silence lasted only for a moment. One of the observers called out: "Torpedo at twelve thirty-seven!"

The data had already been picked up by the robot pilot, and the X-69 shifted course. Roysland could feel the slightly sickish feeling in his stomach under the heavy acceleration as the angular acceleration of the ship changed.

There was nothing to do now but wait. It was up to the robot defenses and the screens to make sure that no enemy torpedo hit the X-69.

The ship lurched again.

Because of their tremendous ac-



celeration, a war torpedo couldn't possibly be a homing type weapon; it moved too fast. Before even a subelectronic relay could operate, the target would be well out of range. The X-69 was in the position of a man ducking thrown stones; the only fatal move would be an inaccurate judgment.

Again the floor jerked beneath them as another enemy torpedo "sizzled" through the place where the ship might have been.

"*Explosion at fifteen-sixty!*" shouted two observers at once.

The FCO's face suddenly broke into a grin. "We did it," he said softly.

Then the intercom flickered on. An excited Space Marine said: "Captain Dobrin! There's something funny going on down here; that Enlissa officer we've got in the brig just dropped dead!"

It was at that instant that Roysland Dwyn found his answer. The pieces of the whole jigsaw puzzle fell into place and made a beautiful picture. And he realized that the Enlissa, too, had changed their battle tactics.

And that was when the explosion hit.

Four torpedoes had come in on the X-69 at once, and the robot had been a fraction of a second too late in computing the trajectories all at once and figuring a safe path.

The screenbuster's detonation jarred the whole ship violently. Then there were two thumps as a pair

of flies came into the hole through the screen and blasted the interior of the cruiser.

Roysland wasn't sure what had happened; the whole control room had suddenly seemed to turn upside down. When he picked himself up from one wall—which had now become "down"—his nose was bleeding, and his right arm was dead to the shoulder. Broken clavicle.

He shook his head groggily and looked around. Captain Dobrin was slumped against a corner of the wall. The FCO was sprawled across the side of his control board. The various observers were tumbled around the room like so many rag dolls shaken up in a shoe box.

Gradually, the gravity righted itself, and Roysland rolled to the floor. He pulled himself up by one arm and ran toward the control panel. He had barely time to sit.

Fortunately, most of the observers were reasonably aware of their surroundings. Those who could move were back at their control boards by the time Roysland reached the fire control board.

A second blast hit the ship, but Roysland was prepared for it this time; his fingers gripped the handholds and strained as the gravity shifted beneath his feet.

The X-69 couldn't stand another one like that. The Enlissa ship had computed better than they had thought.

"*af projectors!*" Roysland shouted. "Prepare to track and fire!"

The only way to save the ship

now was to shoot down every torpedo before it hit.

"All guns tracking, sir," said one of the observers.

"Set and ready!" Roysland said. "Fire automatically!" He punched a button.

The *af* projectors moved in their mounts, each one seeking out a different missile. They would go on seeking until the—

Then the first one fired, and Roysland's mind went blank, as did everyone else's aboard the X-69.

For a long time, Roysland Dwyen watched a play. He was a disinterested spectator, who had not one iota of interest in what was going on. He was much, much, *much* too busy with his own thoughts to be interested with such trivia as his bodily reactions and his exterior environment.

In the first place, he had solved the problem. And such a fascinating problem! The broad ramifications of the whole concept were appalling in their immensity and scope!

Some people came into the control room after a long while and asked him some questions. He answered them politely, but without paying any attention whatsoever to what they were saying.

After all, what could possibly be so utterly absorbing as my own problems? Who could be more important than I?

The people asked him to walk to somewhere, and he did; but he didn't have the slightest notion

where he was going, nor why, nor how. And he really didn't care. They put him in a bed and fed him soup and stuck needles in his arm and several other utterly meaningless things, but it made no difference.

Introspection. Know thyself. And then get going around and around and around on the ever deepening spiral-helix that goes lower and lower as it closes in on itself. Self-analysis. What are my motivations? Why do I want to know what my motivations are? Why am I analyzing myself? Why do I want to know why I am analyzing myself? What do I know about the motivations for desiring to know about the reasons for analyzing myself? Why do I feel that the motivations—

After a long period of being left alone, he was in a place that was different from where he had been before, but it wasn't any different than the place where—

A sudden blazing shock crossed Roysland's mind. With the awful brilliant clarity of a man seeing suddenly into a darkened room when the lights have been lit unexpectedly, Roysland snapped agonizingly back to awareness.

Only for a fraction of a second did he realize what had happened. Then his mind blacked out under the shock.

When he came out of it again, a nurse was standing by his bedside. She smiled at him when he opened his eyes, and said, "How do you feel, sir?"

He thought for a moment, taking

inventory of exactly how he did feel. Then he smiled. "I feel fine. What happened?"

The girl touched a relay plate. "The psychometrist will be in right away, sir. He'll explain things to you." She gave him another flash of white teeth and stepped out of the room.

Less than a minute later, the door opened, and the psychometrist came in. It was Bilford.

"Well, well," Roysland said. "I get special treatment; the chief cheese is in to see me."

Bilford grinned, ran a hand through his hair and nodded. His thin face seemed to almost sparkle from within. "Yup. You're important. I knew you'd want to see someone as soon as you came to."

Roysland propped himself up in bed. "How right you are. The boys have solved the Secret of the Mysterious Weapon, I see. Have they actually made a usable weapon out of it?"

Bilford lifted his eyebrows. "What makes you think they've figured it out?"

Roysland's massive face broke into a grin. "Simple. I'm back among the living again. If I'm right—and I think I am—you undid this feed-back in the prefrontal lobes with an effect similar to the one that caused it. Q. E. D.; You know what caused it."

Bilford nodded. "Good reasoning. And accurate. I guess your brain isn't as burned out as it might be. I guess you can see visitors now."

"Who?" Roysland asked.

Bilford stood up and headed for the door. "Four Special Weapons staff members and a Fleet Commander. They've been waiting to see you for three days, and I told them you'd be out from under this morning." Then he stopped at the door and looked bland. "Of course, if you don't want to see them—"

"Get them in here!" bellowed Roysland.

All Bilford had to do was open the door. Five men came into the room as though the hall were full of poison gas. After a minute or so of inquiring after Roysland's health and expressing their sympathy for his plight, they settled down to business.

"I figured there was something screwy in that story you gave me," Allardyce said. "Going to hunt for animals, indeed?"

Bilford grinned. "I didn't think he was, either. It was brilliant to have those recorders in the Enliss officer's cell. And the other stuff came through perfectly."

Roysland shook his head. "You misunderstand me. I most certainly did intend to get animal specimens. I figured the answer was involved with the aliens themselves, but I didn't know what the gimmick was."

"Now I know that it was the interaction of the af's backwash and the enemy's beam that caused the mind-jammer effect. The enemy's weapon was intended as a death ray, but

for some reason, it doesn't work on humans."

"That's right," said Taddibol. "The enemy projector was designed to disintegrate the molecule of a particular enzyme that is necessary to Enlissa life. It does the job beautifully, too. When the beam hits an Enlissa, the enzyme disintegrates, oxidation can no longer take place in the tissues, and presto! the Enlissa dies. But our own system is so different that the beam doesn't even effect us."

"The answer's been right in front of our eyes for a long time," Kiffer said. "The backwash from the *a*'s has too long a wave length to be effective, and the Enlissa's death ray is too short. But the complex harmonic of the two is just right. It creates a momentary field that causes the loop-feedback to start in the prefrontal lobes. From what we can gather, the effect is one of intense, overpowering curiosity—inwardly directed."

"Statistically," Allerdycce cut in, "it accounts for the peculiar behavior of the enemy ships, too. If we assume that a little over twenty-five per cent of their ships are equipped with what they think is a death ray, you'll get the right figures. About the same number of our ships are equipped with *a*/ projectors.

"When a death-ray ship comes in on an *a*/ ship, the *a*/ guns cut it down and the crew is mindjammed. But if a death-ray ship comes in on one of our conventionally armed ships, they're blasted out of the sky

because they figure that everyone aboard the ship is dead and they don't bother to fire any torpedoes. Our own torpedoes come as a pretty rude surprise. So the enemy has lost one hundred per cent of their death-ray equipped vessels in every engagement!"

Royland nodded. "We couldn't see it because we weren't looking for it. I suspected at first that it had something to do with the *a*'s; the statistics suggested that. But when every test showed that it couldn't possibly be our own projectors, and when this Enlissa projector came along, I made the mistake of dropping the previous line of approach. Keep that in mind, boys; you can forget old *theories*, but you can't forget old *data*.

"By the way, commander, did you figure out how we happened to get the Enlissa ship?"

"Sure," said Allerdycce. "When they came in so close, they were caught by the field that was generated. The thing has an effective englobement volume with a radius of about six hundred miles. We don't know what the effect is near the outside, of course, but we're working on it."

"You know," Royland said, "mankind has known for centuries the old dictum that 'the whole is greater than the sum of its parts,' but we sometimes forget how it works in practice. We still tend to look from cause to effect and from effect to cause.

"But in this case, there were two 'causes' of the mindjammer field, and three 'effects' from the two 'causes.' And that's simplifying a great deal. We still haven't dug into what else we can get from sub-etheric harmonics phenomena."

Royland looked at Bilford. "How did you do this quick-cure stunt?"

Bilford shrugged. "Simple. I fiddled around until I got a sub-etheric harmonic that corresponded to the frequencies of the micro-waves I was using. Works fine."

Kiffer chimed in again with: "With the stuff we got from your instruments on the X-69 I think we can build the weapon we've been so afraid of."

"Won't the Enlissa be able to analyze it?" Bilford asked, interestedly. "After all, we figured it out."

"Not the same thing," said Kiffer. "They don't have *af* projectors yet. They can't accidentally generate the field."

"Besides," Commander Allerdycce said grimly, "we won't leave them any evidence. If the weapon works, we'll beam 'em down, board 'em, and end up with prisoners and a perfectly good ship. The Enlissa will never know what happened to them."

Royland was about to say something when the door flew open and a heavy body propelled its way inside.

It was General Director Eckisster, and he was very obviously seething mad. He glanced around the room and his eyes lit on Bilford.

"May I ask, sir," he thundered, "why I have been kept from seeing Royland Dwyn for two weeks? And why these men are allowed to see him now?" He didn't wait for an answer, but turned toward Royland. "As for you, sir, I am filing a reprimand—officially. You had no business using the X-69 as military vessel during time of war without my permission. You might have been killed, and I need you!"

Royland started to answer, but Commander Allerdycce was one jump ahead of him. He smiled serenely at Eckisster and said: "My dear director, don't you think such an action would be just a bit confusing? Captain Dobrin recommended that Royland Dwyn be given the Golden Cluster for bravery in action above and beyond the call of duty. I added my recommendation and sent it on to the Regent's office. The Regent himself has given his approval. Surely, a reprimand now would be a bit unseemly."

Eckisster glowered. "My dear commander," he said, "it so happens that Royland Dwyn is the mainstay of my directorate. It also happens to be a fact that I have a perfect right to threaten to do any damned thing I want to. It keeps him mad at me, so he works like a beaver to show me up. I threaten, cajole, intimidate, scream, and ask silly questions. It works. If you won't tell me how to run my directorate, I won't tell you how to run your spacefleet. At least not very often. Fair enough?"

Again, he did not pause for an answer, but looked back at Roysland. "And you, you get out of that bed as soon as this twitch doctor lets you. You have a gun to build. A mindjammer. Get busy. I'll expect you in my office later. Good-by." He turned and stamped out.

Allerdyce stared at the closed door for a moment, then turned and grinned. "I guess I got told."

"You did," said Bilford, "and you're going to get told again. All of you. Clear out. The patient has had enough excitement for today. Scram."

It took the five men several more minutes to leave, but Bilford was finally alone with Roysland.

"Did you know that about Eckisster?" Bilford asked. "That he needles people with a purpose in mind?"

"Sure," said Roysland. "I've known it for years. I don't say that it works the way he thinks it does, but at least it keeps the job exciting. I think everybody needs a little needling now and then."

Bilford nodded. "I know you agree with him. You're a bigger needler than he is, any day."

"Me?" Roysland looked surprised.

"Yes, you. Eckisster's needling is effective in a limited way, but yours is not only effective, but efficient. You ask the kind of questions that make people think instead of the kind that make people mad. Where Eckisster jabs in all directions and people jump, you use your needle

with the deftness and precision of a physician using a hypodermic. Eckisster doesn't know what he wants and he doesn't know how to get it. And he wants somebody else to do it for him, whatever it is. On the other hand, you know what you want and how to get it without making everybody hate you, and you'll do the job yourself, if necessary.

"You gave your staff men, Commander Allerdyce, even me, credit for finding out what the mindjammer effect was. But the credit belongs to you. If it weren't for your incessant needling, your ability to arouse interest in seemingly dull facts, your sometimes radical theories, and your propensity for asking searching questions, I doubt if we'd have our answer yet.

"The core of this problem wasn't just the fact that several phenomena combined to give the mindjammer; that was a purely physical effect. The big problem was to get human beings to take their individual fields of thought, work with them in relation to other fields of thought, and come up with useful information that could be fitted together to explain the whole.

"Eckisster's type of needling might make a man work harder, it might even make him *think* harder—but it won't make him think in a different way or look at data from a new angle. Even when your theories are wrong, you use them in such a way that they uncover the data which proves them wrong. And then

you're perfectly* willing to drop them and work out a new hypothesis and get people to try to destroy or confirm it." He stood up and smoothed a palm over his gray hair.

"And now, if you'll excuse me," he said, "I have some more things to work on. I have a hunch that

these subelectronic polar harmonics can do a lot more to the human brain than just knock it silly. When you feel better, I'll tell you all about it." He turned and walked out the door.

Royland lay back on his bed and looked at the ceiling. Me, a needler? he thought, ME?

THE END

THE ANALYTICAL LABORATORY

The story standings this time came out in three divisions; as usual, the novel took first place. A number of people write in, in the course of a year suggesting that we stop running serials. I understand and appreciate their impatience; it would indeed be pleasant if we could publish a sixty thousand word novel in one piece. The hard facts of economics, however, say we can't do it; a magazine large enough in volume to permit that would cost too much. And the simple fact of reader opinion shows up, consistently, with first-place votes for novel instalments.

You readers vote the novels to first place; that means the author gets the 1¢ a word bonus. And it means that I must run novels, doesn't it?

MARCH ISSUE

PLACE	STORY	AUTHOR	POINTS
1.	The Downing Light (Pt. 1)	Robert Randall	1.89
2.	How Allied	Mark Clifton	2.65
3.	A Matter of Security	W. T. Haggert	2.70
4.	Tied:—		
	Man of God	Stephen Bartholomew	3.81
	Marius	Poul Anderson	3.81

THE EDITOR.

AND STILL IT MOVES

BY ERIC FRANK RUSSELL

Concerning the completely unpredictable, remarkably talented and somewhat moronic Eusapia Palladino—who had a hole in her head, which may or may not be important, but could levitate and perform telekinests under the strictest supervision!

If asked to name the most extraordinary character in the last hundred years, the leading candidate for the title of Psi-Psupsreme, nine people out of ten might nominate Daniel Dunglas Home. They'd make a second-rate choice. For all his formidable abilities and baffling performances Home was easily outclassed by an illiterate peasant girl from a village in southern Italy.

The greater wizard.

Name of Eusapia Palladino. Born January 21, 1854, in Minervino, province of Bari, a time and place where none were rich either in intellect or this world's goods. Her mother died soon after she was born. When she was twelve her father was murdered by bandits. Between-times she was dropped on her head and sustained a cranial in-

jury that left a small gap in her skull.

Through her unfortunate childhood Eusapia Palladino betrayed not the slightest hint of her remarkable future. Of nondescript appearance and seemingly average intelligence, she had all the willfulness and independence of an orphan left to hang around until she could find her own niche in life. Most of the time she went her own sweet way, rebuffing all attempts to steer her in directions mere adults thought she ought to go.

By age fourteen she had acquired the sexual precocity of her race and climate. This is not to say she was immoral. Rather did she have an eye too obviously and enthusiastically appreciative of any prime hunk of beefcake that might amble to within

viewing distance. She retained this characteristic for most of her life and frequently it became a source of acute embarrassment to scientists more interested in her paranormal feats than in her mediocre charms.² In the interest of strict accuracy it must be said that she was no Venus; she was short in the leg, dumpy, inclined to fatness and waddled around with gait of an overfed duck.

Also at age fourteen Eusapia began to experience strange inward stirrings other than those attributable to budding womanhood. In later years she described these sensations in detail: a tremendous thrill resembling a peculiar current of energy that flowed upward through her spine, across a shoulder and down an arm as far as the elbow where, in some mysterious way, it seemed to pour outward. Whenever this feeling came upon her she was seized by an irresistible urge to lift things or move things—without bothering to touch them or recognizing any need to do so.

So pointless and unprofitable a desire could be explained by the fact that Eusapia was an adolescent with a hole in her head. No doubt the simple folk of her village would have been well-satisfied with this diagnosis were it not for a fact too incredible to believe, too self-evident to disbelieve.

Things moved.

It was a major sensation. The entire village awoke from its rural slumbers. Each and every spectator dragged along half a dozen compan-

ions to bear witness to his own sobriety and the fact that they could see what he could see. Gratified at thus becoming the center of attention, Eusapia juggled pots and pans, jugs and ornaments, tables and chairs, levitating them with an impressive equanimity that astounded the onlookers. Most anything transportable flew through the air with the greatest of ease, untouched by human hands.

Church authorities retired to a dignified distance and left the laymen to argue whether this paragon was saint or witch, blessed by God or possessed of the Devil. Finally, with Eusapia's consent, her admirers settled for spiritualistic mediumship and thus offended neither Jehovah nor Beelzebub. This is what might be called rural diplomacy. Besides, at that time the spirits of the dear departed were very much in fashion, plenty popular enough to be a world-wide fad.

With that problem settled the people commenced to brag, as people will. Eusapia had put their kraal on the map and they intended it to stay there. This article is proof positive that they succeeded. News of Eusapia's weird accomplishments spread far and wide, almost wholly by word of mouth. It wasn't long before she was conducting her own circles and gaining a useful living as a medium. For the next twenty years she was more or less kept by a growing group of faithful followers who let their mouths hang open

while tables floated and chairs jounced around. She was definitely the better mousetrap.

The number of times Eusapia put over her performance during these two decades has never been recorded, will never be known. No reasonable guess can be made of the size of the multitude who witnessed her efforts during this long time, or the number of smarties who tried to catch her out and failed. All that can be said with assurance is that repeatedly her story reached the big cities of Europe where it was received with nods and winks, dismissed with shrugs.

In 1888, when Eusapia was thirty-four years old and had already surpassed D. D. Home in sheer profuseness of phenomena, the ludicrous tale of her lifting abilities came to the ears of Professor Enrico Chiaja of Naples. He'd heard it before, at least a dozen times. That was what intrigued him. How could a story so silly be so darned persistent? He thought it over. He had a couple of days to spare and was suffering a persistent itch in his bump of curiosity.

Chiaja went to see Eusapia. He introduced himself, informed her that (a) he had an open mind, (b) sharp eyes, and (c) was a Neapolitan—the latter being tantamount to announcing his arrival from Missouri. Possibly feeling that this called for a king-size celebration, Eusapia moved most everything except the house itself. As a clincher, if such were needed, she floated a

short distance from the floor, complete with the chair in which she was sitting.

Returning home, Chiaja spent a few days trying to work out how he'd been taken. Obviously there had to be fraud somewhere. You just can't abolish natural laws like that. But the longer he thought of it the more surely he came back to the only answer: "You *can*—because she *did*!"

Frankly baffled, he visited Eusapia again. This time he opined that the true test of deliberateness is the ability to do it twice. Eusapia did not resent the suggestion despite that she'd already done it more times than she'd care to count. She obliged by repeating the whole performance from first to last.

Back in Naples, Chiaja brooded quite a piece, came to several conclusions. Firstly, some if not all of the phenomena had been produced in circumstances that made trickery well-nigh impossible. Secondly, with or without the aid of hypothetical spirits, one cannot impart motion to an inanimate object except by applying force thereto. Thirdly, since physical force had not been visibly applied, some invisible form of force must have been used.

Conceivably it could be mental force. If so, Eusapia was a cerebral freak worthy of exhaustive study. There were other specialists more competent than himself to cope with a strange female who could poke things around with her mind. In Italy itself was the ideal investigator,

namely, Professor Cesare Lombroso. On August 9, 1888, the *Fanfalletta della Domenica* published an open letter from Chiaja in which he invited Lombroso to try solve the puzzle of Eusapia Palladino.

Lombroso, a formidable character, was at that time highly regarded as the world's leading alienist and criminologist—and he was also one of the then popular spiritualist movement's severest critics. As such he had no time to waste upon the machinations of moaning mediums. He replied to Chiaja in polite terms saying he wasn't interested.

Nothing daunted, Chiaja wrote him direct, urging him not to be misled by the thousand-and-one fantastic stories littering spiritualism's garbage dump. Lombroso refused to bite. Chiaja wrote yet again. Lombroso replied somewhat testily that he was taking no time off to investigate the figments of someone else's imagination.

By now Chiaja found his own incontinuity becoming too much for his comfort. Many days had gone by; in retrospect the astonishing capers of Eusapia had acquired an illusionary quality. He needed to reassure himself. He went to see Eusapia a third time.

The result of that was that he resumed chivvying Lombroso more energetically than ever and continued to do so for most of three years. At last, with great reluctance, Lombroso gave way, presumably because he did not relish the idea of being

pestered for the rest of his natural life.

In February, 1891, the ungainly Eusapia Palladino let her big eyes roam with undisguised appetite over a slightly hostile committee of six: Professor Cesare Lombroso, Professor Tamburini, Messrs. Ascenzi, Gagli, Vizioli and Ciolfi.

Somewhat impatiently, Lombroso invited her to perform.

She did.

In full light, with no paraphernalia worth mentioning, she produced levitational and telekinetic phenomena of a kind and quantity that the most accomplished vaudeville illusionist would greatly have envied. The six watched her like hawks, hoping to catch her out. They didn't. They subjected her to several spur-of-the-moment tests. It made no difference. She couldn't be trapped. Eusapia went home, triumphant. The six remained, dumbfounded. They had been confronted with precisely the same fact that Chiaja had faced.

Eppur si muove!

Lombroso was a specialist of some moral courage. Much as it went against the grain for him to do so, he published a paper vouching for the genuineness of Eusapia's talents. He, personally, confirmed that she could and did do the remarkable things she was alleged to do. He confirmed them because he could no longer deny them, having witnessed them for himself.

But, emphasized Lombroso, he wasn't yet ready to swallow the spirit-theory. Eusapia had offered no

proof that spirits existed, had done nothing to imply their existence. He was thoroughly satisfied that Eusapia Palladino could exercise a power not yet known to science. Somewhere, he believed, there must be a perfectly natural explanation and it was his opinion that such an explanation was well worth seeking.

The international spiritualist movement drew cold comfort from Lombroso's strictures and was swift to seek consolation by claiming that a "great medium" had been "indorsed by science." Thus is science itself used to establish superstition's right to rush in and fill any vacuum left by science.

Lombroso's paper did not bring down upon him the tremendous, worldwide torrent of abuse such as had almost drowned the reputation of William Crookes when, at earlier date, he had similarly vouched for the paranormal aptitudes of D. D. Home.

There were several reasons why Lombroso escaped a hearty lambasting at the hands of his scientific fellows. Currently spiritualism was at the high peak of popularity, any attack upon it was by the same token unpopular—and even the professional scientist likes to be circumspect. Then again, although Lombroso had given support to a medium he had refused support to superstition and that made him a good deal less vulnerable to attack.

Lastly but far from leastly, Lombroso was not a physicist such as Crookes had been. He was an emi-

nent alienist, just about the last man on earth with whom to bandy words about the mentality of the credulous. Would-be critics—and there was a veritable army of them—found themselves in the unhappy position of having to fight Lombroso on his own ground, not on theirs. The majority of them found little difficulty in perceiving that discretion is the better part of valor.

As for Eusapia, she resumed her former life among her own followers—until Lombroso's testimonial hit the headlines. That did it! Practically overnight she was swept to world-fame or world-notoriety, according to how one looks at it.

Forthwith a number of scientists and scientific laymen fought to get at her. Their motives were various. Some possibly thought they were climbing aboard the Lombroso bandwagon. Some were piqued and could not rest until curiosity was satisfied. A good many hoped to prove trickery by showing how it was done. The majority were imbued by genuine interest in what looked like a new and fruitful field of research. By and large they were honest, intelligent men anxious to discover just what made Eusapia tick.

Thus she became the first and only paranormal to provide a long, detailed case history for the experts.

An annoying difficulty popped up right at the start and stayed put for keeps. It was about the worst thing that could have happened. It was the sort of thing that isn't thought

of in fiction but does occur in real life and thus teaches authors to be humble.

Fame went to Eusapia's head. She already had something of the mentality of a juvenile delinquent and the limelight didn't improve her any. She became more temperamental than any prima donna and expressed her moods by cheating. Time and again she aggravated her investigators by switching from inexplicable and often spectacular phenomena to silly, childish tricks that would not have fooled a kid of nine.

Whenever she found herself disliking the fact that experts were far more interested in her as a psionic specimen than as a warm-blooded woman—and she resented it very often—she became petulant and tried to bollix their efforts with stupid stratagems. Whenever she happened to be tired, bored, off-color or otherwise in no humor to produce the real McCoy, she conceived the notion that she was the great La Palladino who could not let her public down. The show must go on even when the star couldn't blow hard enough to fill a penny balloon. The show went on—wholly faked.

As soon as these tantrums became known they were sheer joy to a sizable part of the scientific world that had no time for Eusapia and little patience with those who did have time for her. The critics who had been lying low now emerged in full cry, baying like hounds closing in for the kill. From then on

their theme remained constant: a fraud part of the time has got to be a fraud all the time.

Such a situation provided poor help and little encouragement to the next bunch of experts who handled Eusapia in 1892. But they persisted and put her through the hoop. Not once. Not twice. Seventeen times.

Gallantly fumbling for an effective technique where none yet existed, they were Dr. Emacora, Dr. Charles du Prel of Munich, Dr. Aksakov of Moscow, Professor Charles Richet of the Sorbonne, Professor Buffern, Professor Gerosa and, presiding over the inquisition, Professor Schiaparelli, director of the Observatory of Milan. They issued a report, careful, restrained, but positive. It said, in effect, that Eusapia Palladino had done things that could not be done. They could offer no theory to account for it.

Next, Professor Wagner, of the University of St. Petersburg, presided over a number of "séances" in Naples where Eusapia got going with the old routine and left the unfortunate Wagner holding nothing save considerable food for thought. Not much value can be attached to that episode: for all his professorship Wagner was far from being a competent investigator and was already neck-deep in spiritualistic rigmoroles.

Eusapia now got passed along to Professor Julian Ochocowicz of Warsaw, a determined investigator who liked to dig deep for prime causes. Ochocowicz was a stickler. He made

Eusapia do her act no less than forty times. All he got out of it was the frustrating fact that she could do forty times a lot of things she shouldn't have been able to do a mere once.

Back in Rome, 1894, Eusapia created motion without applying visible force for the benefit of an investigatory party consisting of Baron von Schrenck-Notzing, Dr. Dobrzycki, Professor Richet, Professor Danilewski and Professor Lombroso "the Master of Turin." A short time afterward she did it again—and again and again—for the benefit of a foursome made up of Mr. F. H. W. Myers, Professor Richet, Professor Ochorowicz and Sir Oliver Lodge.

The next year Eusapia accepted an invitation to Britain. The trip proved a gigantic flop. The hot-blooded, excitable Eusapia found herself ill at ease among her cold-blooded, phlegmatic British hosts. She didn't like their snooty ways; they didn't like her pagan manners. There was a wonderful clash of personalities. Eusapia infuriated British wives by switching from the prurient to the perusal, then annoyed the husbands by cheating right, left and center, being caught out all along the line and not caring a hoot. The baying of the hounds grew deafening. Eusapia took her departure under what critics described, with much licking of lips and displaying of sharp teeth, as a "cloud of ignominy."

That should have been the end of her. It wasn't. Once back in the sunny warmth of Naples she recovered confidence and worldwide howls of, "Fraud!" rang upon deaf ears. Willingly she played handy-pandy with Dr. Paolo Visani-Sonzi, a leading neurologist, and fazed him from here to there. Around the same time she took on without a single qualm and baffled a group consisting of Colonel Albert de Rochas, Dr. Dariex, Baron de Watteville, Dr. Joseph Maxwell and Professor Sabatier.

Through 1896-7-8 she really got into her stride, despite the steady muttering from across the English Channel where Professor Henry Sidgwick, at that time one of the leading lights of the National Society for Psychical Research, was damning her for a deceitful hussy. She put on a long and spectacular series of performances, usually described as "seances," at Auteuil, Choisy-Yvrac, Tremezzo, Naples and Montfort l'Amaury. These were well attended by experts of one sort or another.

At all of them Eusapia continued shamelessly to ogle any member of the audience who took her fancy. Characteristically she bedevilled investigators with pieces of petty tomfoolery among which she interspersed samples of phenomena that shouldn't happen, couldn't happen but nevertheless did happen.

Two witnesses, G. de Fontenay and Colonel Albert de Rochas, were sufficiently impressed to write and

publish books about the mysterious doings of Eusapia. Outlets for that sort of stuff were—and still are—all too few. The recognized scientific journals barred such material from their pages and resolutely ignored the fact that those probing beyond the frontier of knowledge included scientists of world-renown. Thus reports, discussions, theories and debates were confined to individual books, pamphlets—or the pages of spiritualistic publications. Again superstition was filling a vacuum, as invariably it does.

Among those attending the performances at Montfort l'Amaury was Professor Camille Flammarion. He was sufficiently impressed to invite Eusapia to Paris. She accepted with what Mark Twain has described as "the calm confidence of a Christian with four aces." That confidence proved justified enough to hush the distant voice of Sidgwick. She levitated this, that and the other, including herself, for the benefit of audiences among which were Flammarion, both the Curies, Morselli, Lodge, de Rochas, Richet, d'Arsonval, Myers, Porro, Vaugenis, Ballet, Bergson and many more well-known in the world of science.

In Genoa, 1901, substantially the same experiments were conducted in full light by Professor Porro, M. de Alberghis and Professor Morselli. Seated in a chair Eusapia went up, chair and all, to table-top height while Porro and Morselli tried in vain to detect evidence of pressure

on the floor beneath the chair. Then, with her ankles tied to the chair-legs, her hands held by witnesses standing either side, she caused a wooden table two feet by three to float nine inches above the floor. Soon afterward she repeated these and similar stunts *ad lib* for the benefit of Professors Porro, Morselli, Bozzano, Barzini, Venturo, Vassallo, Lombroso and a number of associated laymen. Three of them published books on the subject. So far as can be traced not a single scientific journal bothered even to review a copy. However, the professional vacuum-fillers whooped 'em up.

Through the following years the story remained much the same. Dr. Carmelo Samona gave Eusapia the works, published his report in a sheet called "Annals of Psychic Science," there being no place else. Professor Henry Morselli, Director of the Clinic for Nervous and Mental Diseases at Genoa, put Eusapia through long, tedious sessions in his laboratory, wrote up the result in a tremendous work of two volumes. In 1907 Professor Cesare Lombroso followed suit; with his assistants Doctors Imoda and Audemino he persuaded Eusapia to play in the clinical laboratories of the University of Turin. Lombroso then wrote a book. The same year Professors Oscar Scarpa, Luigi Lombardi, Galeotti, Bottazzi, Sergio Panzini, De Amicis, Charles Foa, Aggazzotti and others enticed Eusapia into the physiological laboratory of the University of Naples. They found she was a

shameless cheat—but not all the time. The other times could not be satisfactorily explained.

By 1908 Eusapia was spending more time in laboratories than in spook-ridden attics or cellars. Professor Bottazzi got her to perform several times in his laboratory while checked by himself, Professor Gilman Hall and Dr. Herbert R. Moody, chemistry professor of the City College of New York.

During the same period, 1905-6-7-8, Eusapia was observed, examined, inspected, analyzed and generally given what was then considered the Full Treatment at the Paris Psychological Institute. She was made to levitate this, that and the other, hidden or in plain view, loose or caged, and do it while standing up, sitting down, lying full length bound or unbound, in dim red light, half-light, full light, almost every thinkable light. She cheated, taunted and tantalized—but after proving herself a barefaced fraud immediately went on to prove that she wasn't or made it impossible to prove that she was.

A typical instance: surrounded by Ballet, the Curies, de Gramont, Courtier, Bergson, Richet, Yourievitch, Vaugeois, Favre, d'Arsonval, Flammarion, Dastre, Sardou, Delanne and several others, she was seated upon a weighing machine. De Gramont held her legs, d'Arsonval held her right hand, Yourievitch her left. The others formed a close chain around her. She was then invited to levitate a nearby table the

legs of which had been encased in special metal sheaths which, it was thought, might ground or screen whatever power she was using.

Up went the table, slowly, tortuously, to a height of ten or twelve inches, and then dropped back. They asked her if she could lift it completely clear of the leg-sheaths. Up it went again, gradually came free, moved laterally and with a peculiar wobbling motion, dropped to floor. Meanwhile the weighing machine had registered an increase in mass roughly equal to that of the table.

The Paris Psychological Institute published a two-volume report on the fun it had had with Eusapia over these four years. It became part of spiritualism's holy library. The scientific world gave it the bum's rush.

Eusapia took revenge on Britain's National Society for Psychical Research in November-December 1908. Two members of the S. P. R.'s Council visited her, Mr. W. W. Baggally and the Hon. Everard Feilding. They were accompanied by the American psychic investigator, Hereward Carrington. Feilding was a chronic sceptic. Baggally was an expert illusionist who thought he had yet to meet a medium capable of anything extraordinary. The third one, Carrington, had devoted a lot of time to exposing spiritualistic frauds, knew a lot about slick tricks and had published a book on the subject.

This trio held a series of stances

in Naples. It got them right back where Chiaja and Lombroso had been years before. *Eppur si muove!* Their report divided the S. P. R. into heatedly warring factions, the Sedgwick can't-kid-me mob versus the Feilding none-so-blind caucus.

Hereward Carrington and Dr. James H. Hyslop of the American Society for Psychical Research now persuaded Eusapia to visit the States. She arrived on November 10, 1909. It was a mistake. She found herself as much if not more of a fish out of water as she had been in Britain.

A raving mob of reporters raided her ship, shouted, shoved, brawled, demanded the immediate production of clearly visible and spectacular miracles. She was smuggled ashore and hidden, but an army of journalists tracked Carrington around with such persistence that they kept him from Eusapia and made his life a misery. In sheer desperation he made a bargain with them: Eusapia's first seance would be held especially for the benefit of the press if they'd cease to chivvy her thereafter.

It was done. All papers made report on the result, the New York *Times* and New York *Sun* writing it up at full length. The gist of their remarks was that strange stunts had been performed and "nobody had succeeded in detecting fraud."

Between then and June 18, 1910, when she returned home, Eusapia Palladino gave between thirty and forty paranormal exhibitions described as "seances." All in all they

weren't so hot. She didn't like the States, didn't like the constant importunings from circus proprietors and vaudeville managers, didn't like the general atmosphere of sensationalism. To make matters worse she was beginning to feel her years, her powers were fading, she gave way frequently to the temptation to "fill in" with trickery.

She was patently fed up and had to be constantly chivvied by Carrington to produce. All the same, she did produce enough to worry some witnesses and convince others that the cup of wisdom is far from full. Among her audiences were Professor R. W. Wood (Physics, Johns Hopkins), Professor Augustus Trowbridge (Physics, Princeton), Professor Hugo Munsterberg (Psychology, Harvard), Dr. Charles R. Dana (Psychiatry, Cornell), Professor E. B. Wilson (Biology, Princeton), Professor Dickinson Miller (Philosophy, Columbia), Professor H. G. Lord (Philosophy, Columbia), Professor W. B. Pitkin (Philosophy, Columbia), Professor Frederick Peterson (Psychiatry, Columbia), Professor William Hallock (Physics, Columbia), James L. Kellogg, John W. Sargent and Howard Thurston—all professional illusionists—and a good many more.

Dana, Hallock, Miller, Peterson, Pitkin, Trowbridge, Wilson and Wood, published a joint statement in *Science*, May 20, 1910—reprinted in New York *Times*—to the effect they'd found plenty of evidence of trickery, none of supernatural pow-

ers. This was hardly to be wondered at, seeing that Eusapia had not strained herself unduly to impress them.

On the other hand, with typical quirk of character she took a fancy to Howard Thurston, then a top-flight magician. Thurston, who considered with good reason that his calling made him an expert trapper of tricksters, was sufficiently impressed with Eusapia to write to the *New York Times*, May 12, 1910, affirming that she could do and had done things not possible by any form of fraud and publicly offering to "forfeit \$1,000 to any charitable institution named if it can be proved that Madame Palladino cannot levitate a table without resort to trickery or fraud." The *New York Times* gave it considerable publicity, but there were no takers.

A most curious feature of one United States seance has been played down, possibly because it is not thought to have any significance. Surprising that Professors Wood and Trowbridge didn't ponder it—they were both there at the time.

This was the third seance, held at Lincoln Square Arcade, New York City, November 19, 1909. A dozen people attended, including Professors Wood and Trowbridge, also Dr. A. Caccini. The latter brought with him a small fox terrier with the very laudable intention of "seeing if the animal perceived anything unusual during the seance." It didn't.

Eusapia's act was spoiled at the

start by the strange behavior of a certain individual identified in reports only as "Doctor X." This character seated himself opposite her and fastened her with a "fixed glare." Eusapia became uneasy, then fidgety, insisted on Dr. X changing position a couple of times. He did so in complete silence, then resumed his glaring without batting an eyelid. Eusapia struggled to produce phenomena and failed. She flew into a rage, demanded to know what was eating Dr. X. He refused to say a word or even open his mouth. His manner was that of one willing to maintain his glare unto the crack of doom. Finally, after a frustrating half-hour, Eusapia became slightly hysterical and refused to continue her attempts unless Dr. X left the circle. This he did, removing his fixed gaze and speaking for the first time—whereupon the following brief but noteworthy conversation took place between him and Mrs. Carrington.

Dr. X: "Of course, the table will move *now*."

Mrs. Carrington: "Why? Did you *will* the table not to move?"

Dr. X: "Certainly."

Mrs. Carrington: "Why? Don't you want any phenomena to occur?"

Dr. X: "No—I want to prove my *theory*."

Dr. X added that he was of the firm opinion that *if* Eusapia could move objects by expending mental energy in willing them to move, then by willing the contrary he could prevent such motion. He considered

that he had proved his point. Some time afterward Hereward Carrington revealed that "Dr. X" was the late Leonard Keane Hirschburg of Johns Hopkins University. Nobody appears to have attached much importance to Hirschburg's negative form of proof despite that not long after he'd taken his departure the table did jazz around as he'd predicted.

Taken as a whole, Eusapia's trip to the States was unsatisfactory. Plenty of people caught her red-handed in the practice of deceit, said so in loud voices and got massive publicity. Most of them made their condemnation one hundred per cent by the usual tactic of ignoring every exception to the rule, by disregarding all the instances where she'd successfully defied every attempt to catch her out. Some folk had found baffling, inexplicable happenings among the general foolery and conceded that she had something—though less of it than of yore.

She was on the skids and knew it. There was about her much of the pathetic desperation of the one-time genius whose powers are fading fast. For forty years she'd been the Queen of the Supernormal and now her reign was nearly through. Her health was failing rapidly, her spirit with it. By the time she returned to Europe she was finished.

Nothing more was heard of her until May 16, 1918, when for the last time her name hit the headlines

of the world's leading newspapers. Eusapia Palladino was dead.

During her life she had produced far more phenomena for the benefit of far more inquiring minds than had any similar oddity in human history. She was a blatant cheat who satisfied many eminent men beyond all reasonable doubt that she was not wholly a cheat, that from time to time she could do and did do things for which no satisfactory explanation could be found.

A noteworthy point: her inquirers included eminent philosophers, psychiatrists, chemists, engineers, neurologists, alienists, physicists, astronomers—but not a single psionist. Every expert was working outside his own especial field, compelled to operate by common sense and rule of thumb. There was not then and there is not now a rigorous technique for testing a paranormal under laboratory conditions. There were no psionists.

The strange story of her life might suitably be concluded by remarking that nobody seems ever to have suspected her of powers different from those advertised. It is remotely possible, for instance, that she was a natural-born hypnotist of formidable ability, quite unable to levitate a pretzel but fully capable of convincing everyone that she could do so—even to the extent of making them misread a weighing machine.

At that, she'd be no less a paranormal. Eusapia Palladino has gone into the past. She still remains an unsolved enigma.

BIBLIOGRAPHY

"The Supernormal"	Dr. G. C. Barnard
"On The Threshold Of The Unseen"	Sir W. F. Barrett
"Nel Mondo dei Morti"	Ernesto Baroni
"Ipotesi Spiritica e Teoriche Scientifiche"	Prof. M. Bozzano
"Hey-Day Of A Wizard"	Jean Burton
"Eusapia Palladino And Her Phenomena"	Hereward Carrington
"The Physical Phenomena Of Spiritualism"	Hereward Carrington
"The American Seances With Eusapia Palladino"	Hereward Carrington
"The Reality Of Psychic Phenomena"	Dr. W. J. Crawford
"Very Peculiar People"	Dr. E. J. Dingwall
"The Unknown—Is It Nearer?"	Dr. E. J. Dingwall with John Langdon-Davies
"Mysterious Psychic Forces"	Prof. Camille Flammarion & C. de Fontenay
"Apocops d'Eusapia Palladino"	Prof. Cesare Lombroso
"After Death—What?"	Prof. Enrico Moricelli
"Psicologia e Spiritismo"	Prof. Charles Richet
"Thirty Years Of Psychic Research"	A. de Rochas
"The Externalization Of Motivity"	Sadhuverell Sitwell
"Poltergeists"	Dr. Alfred Sill
"Borderlands Of Science"	Prof. M. Vassallo
"Nel Mondo degli Invisibili"	

Articles about Palladino, pen and con but mostly con, appeared in *American Review of Reviews*, July, 1910, *Cosmopolitan*, Feb., 1910, *Current Literature*, Jan., 1910, *Nation*, Feb. 3, 1910, *Collier's Weekly*, May 14, 1910, *Reformed Church Review*, #4, 1910, and most Sunday supplements in the first half of 1910.

THE END

IN TIMES TO COME

Isaac Asimov, as most readers know, has a profession; he's a professor of biochemistry. Ike, again, takes over a large share of *Astounding* next issue, with a long novelette titled "Profession," plus an article on biochemistry—of course—about "The Sea Urchin And We."

"Profession," however, has very little to do with biochemistry, though it does have to do with educational processes. It concerns the unhappy state of a young man in a culture that has reduced the problem of education to one of implanting, via tape-recorded projectors, all the knowledge needed to practice a profession. But for some few—the tapes don't work. What can be done for those individuals for whom even the ultimate perfection of canned education won't work . . . ?

THE EDITOR.

ADDENDUM ON THE SYMBOLIC PSIONIC MACHINE

A large number of letters have come in, asking for more exact details on the construction of the Hieronymus machine, Symbolic type.

Look, friends, this thing is in an extremely crude, hyper-primitive stage of development. It is not in a precision-manufacture stage, and there's no use kidding ourselves that it is. It's strictly from amateur, and slop-happy amateur at that. We don't have enough data on the field to be able to make the slightest intelligent guesstimate of what will and won't work, and certainly our theories aren't good enough even to rate the term "theories." They're hunches, which may lead to hypotheses, which may some day lead to theories.

In asking for precise details, you are asking Ugh, the original inventor of the stone hammer, for exact specifications on geologic age of the flint used, the exact weight in grams,

mass distribution curves, and the tensile strength of the rawhide thongs used to lace the handle in place. From Ugh, you would get a completely blank look. From me, you get something of the same. "Get . . . I dunno what kind of paper I put the India ink on, fellas."

Some have asked if you can leave out parts and have it work. Heck, how should I know? You saw pictures of the way I built mine; how much more you can leave out I don't know—why don't you try it and see? Why ask me? I'm no authority on this business; I'm just an amateur.

Reports coming in from various people indicate that workable, builder-scaringly successful models have been made from cardboard, plastic, bakelite, rubber tiles, and sheet metal. The original physical-component models are rarer, of course, but several of those have reported in; some with successes, some with

no dice. One very successful unit was built in England, by Mr. Eric Jones.

One thing, I think, is of importance here. Working from printed instructions only, I built a device which produced an effect. I wrote up the explanation, which appeared in the June 1936 issue. Eric Jones, personally unknown to me, working from the printed description, built the described device, and got the predicted results, according to reports of his exhibition of the gadget at a local Hobbies Fair.

Conclusion: Hieronymus has a valid patent, a true, scientific patent, in that an individual reading his patent, and following his statements, can construct a device which performs as predicted in the patent. That that individual can, in turn, report on the device in printed, clear English language, and instruct a third individual adequately to permit him to repeat the experiment successfully.

Psionics has, thereby, reached the level of a repeatable experiment. An individual not personally known to the writer of the instructions, and not personally instructed, can, and has, duplicated the described experiment.

Psionics hasn't reached the "This is why . . ." level; but it has reached and passed the "This is how . . ." stage. Clear, successful communication in standard English language has been achieved.

Many people have asked whether

you can do away with the symbols completely, and just make motions in the air. I dunno, I'm sure. Why not try it? If you find out what motions work, try writing a report, and see if someone unknown to you, and not instructed by you, can get predictable results by following the instructions. If they can, you're doing fine. If they can't, you don't know enough about the process to communicate it successfully; go back and try again.

In the meantime, if you can't take the trouble to draw an Hieronymus machine, and want to have some fun experimenting, try the old pendulum gadget. It does something for some people. Might work for you, too.

Put a weight—anything weighing about an ounce will do nicely—on the end of a thread about ten inches long. Hold the thread in your fingers, holding your arm slightly bent, and away from support on your body, or a table or anything. The pendulum simply serves as a visible indicator of slight movements of your arm; you make it move, of course, it's not any mysterious spirit forces playing esoteric games with the laws of physics.

But the pendulum is sensitive to very slight movements of your arm; it'll help to allow you to express any psionic sensitivity you may have, because it's not a contra-psi oriented method of expression. Nobody has drilled into you that you can't possibly wiggle your arm psionically. Some people can; maybe you can.

Holding the pendulum, start off by getting it swinging back and forth, and then ask it to indicate "Yes," so you can establish the coding method to be used. Then ask it to indicate "No."

I've seen it used for finding lost articles. Probably the individual knew where the lost item was already, but she certainly hadn't been able to bring the knowledge to conscious attention in any normal way. Maybe deep-trance hypnosis would have worked as well, but the pendulum was a damned sight quicker and easier. One man who tried the Hieronymus machine couldn't get a thing out of it directly—but got fine results when he used the pendulum over the Hieronymus machine's tactile plate, while tuning the prism.

The pendulum is perhaps the simplest of all aids to psionic reaction detection. It's also less specific, in that you've got to be good at "Twenty Questions" to get any use-

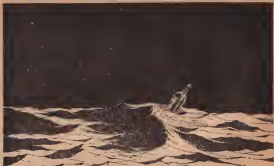
ful information rapidly out of a simple yes-no system.

For a simple, primitive gimmick, it can be fun, and damned if it isn't practically useful. It's proven highly helpful in the ever-recurrent problem of where in blazes the kids left the missing galosh, mitten, or hat, or where that insurance premium receipt got itself misfiled. So it does not work every time; so what? Sometimes it does, and saves an awful lot of rummaging around.

Whether the pendulum is a psionic device or not, I wouldn't know. But whether it taps the subconscious or the super-hyper-ultra-conscious makes relatively little difference in the practical matter of finding a missing, and needed, answer. Maybe it is "simply" tapping subconscious memories—if so, it brings up buried memories a lot faster than any psychiatrist I've ever heard of.

JOHN W. CAMPBELL, JR.





DRIFT

The weird contraption was, beyond doubt, from Outside. From far away in Space, and far away in another dimension, too...and for all of that was a very homey, common, understandable thing.

BY A. BERTRAM CHANDLER

Illustrated by van Dongen

Standing on the boat deck, by number three hatch, the blonde saw the Third Officer walk to the wing of the bridge. What he was carrying was, indubitably, a gin bottle. The Third threw the bottle out and away, watched it until it fell into the water

well clear of the ship's side, then returned to the wheelhouse. Later in the day, that afternoon, in fact, the Third was partnered with the blonde in a deck golf foursome.

"Really, Jimmy," she said, "you officers go altogether too far."

"What do you mean?" he asked.

"Drinking on watch. I saw you dumping the empties this morning."

"It was an empty, all right," he told her, "but it wasn't emptied on the bridge. It was one of the Mate's. And it had a message in it."

"How romantic! Pirates? Buried treasure?"

"No. Just date and time and position of dumping. We do it for the Hydrographic Office. It gives 'em data—if the bottles are ever picked up—for their current charts and such. Drift, and all that."

"I see," she said.

Jimmy Furness shifted uncomfortably. The grassy bank on which he was lying was not the most comfortable of couches, he was sure^b that the stone that he had found when first he sat down had left a large bruise on his right hip. Already his right arm was numb with the weight of the girl's head. And now, of all things, she had to talk about astronomy. She was as bad as that blonde—what was her name?—who, during his last voyage, had got far too interested in meteorology.

"What's that bright one there?" asked the girl.

"Jupiter," said Furness.

"Has it got people?"

"I doubt it. As far as we know, the only planet in the Solar System that shows any signs at all of possessing life is Mars—"

"The Canals—" murmured the girl.

"If there *are* Canals—" He start-

ed, in spite of himself, to warm up to his subject. "According to some astronomers, there must be at least a billion Earth type planets in this galaxy alone. They would be capable of supporting life as we know it. All these stars we see—I don't mean the planets, of course—are suns, each of which has worlds revolving around it—"

"But what about shooting stars?"

"They aren't *stars*, darling. They are merely banks of cosmic debris that fall into the Earth's atmosphere, and become incandescent during their fall—"

"Look!" she said. "There's one!"

"God!" he ejaculated. "That's going to be close!"

His instincts urged him to run, but reason told him that to run was useless. Hastily, he grabbed the girl, turned her so that she was lying on her face. He flung himself on top of her—a futile gesture of protection in the event of a direct hit, but of some value as cover from the flying fragments of a near miss. His eyes were closed, yet he was still conscious of the dreadful glare of the meteorite. The air was alive with the screaming roar of it, and he felt a sensation of burning heat all along his back.

The meteorite hit. The blast of the impact lifted them from the ground, flung them several yards. Furness was first to recover. He got to his feet, staggered to where the girl was sprawled on the grass. He knelt beside her. He tried to lift her.

"Madge!" he asked anxiously. "Madge! Are you all right?"

"Yes," she said at last, but without conviction. "Yes, I think so."

Furness realized suddenly that he could see her pale, stained face far more clearly than he should have done by starlight. He looked away from her, looked to where the meteorite had fallen. The thing was glowing—and the light of it seemed to be brightening rather than dulling as it cooled. It was glowing—and then, suddenly, began to flash. The crazy thought crossed Furness' mind that it was flashing in Morse code—but that, he knew, was impossible. Even so, there was a regular sequence of long and short flashes, too regular to be accounted for by any explanation involving cooling and contraction.

"We must look at this," he said shakily.

"Don't," said the girl.

He ignored her, got up from his knees and walked slowly to the shallow crater. In the center of the pit lay the meteorite—a brightly glowing ovoid. The light of it waxed and waned, waxed and waned, and with every pulsation the glare became more intolerable, so that Furness had to look at it, as he approached, through slitted eyelids. There was sound, too, a continuous high-pitched whistle, almost supersonic.

"I don't like this," he said abruptly; almost ran back to where the girl was standing.

"What's wrong?" she asked.

"It's not a meteorite. It's some sort of missile. It's liable to go up at any moment."

"What can we do?"

"Straight home," he said. "Your house is nearer. We'll phone the police."

Madge's parents, seeing their daughter suffering the after effects of some sort of shock, demanded an explanation. Furness talked hard and was at last allowed to use the telephone. He got through to the local police station.

"Yes," he said, "in that field by Hanman's Wood. . . . No. It's not a shooting star. It could be a rocket. It could have an atomic warhead. . . . You'd better get a man to watch it, keep people away from it. . . . Yes, I'll come out with you. I'm at Mr. Wendell's. Yes—in Rankin's Lane. . . . Ten minutes? Right."

While waiting for the police car, Furness went out into the garden with Mr. Wendell. They looked in the direction of Hanman's Wood. There was a light there, a light like an aircraft beacon, flashing at regular intervals.

"Jimmy," said Wendell, "do you think that I should get Madge and her mother away from here? If that thing's going to go up—"

"I think," said Furness, "that, if it is a rocket, it must be one of ours, and that all this light flashing and whistling is so that it can be found easily when it comes down—"

"I wonder if there's anything

about it on the radio," said Wendell.

They went inside. Wendell switched on the radio, but they never heard any report. Some powerful transmitter close by was jamming reception on all frequencies. Furness realized suddenly that the spacing of the dots and dashes followed the same pattern as that of the flashing light.

A car drew up outside the house. There were footsteps on the path. The bell of the front door rang.

"That'll be the police," said Furness. "I'll go."

The older man followed him to the door.

"Inspector Welsh," he said to the uniformed police officer standing there. "do you think we should evacuate?"

"If there's any need for *that*, Mr. Wendell, we'll soon tell you. Now, sir, are you Mr. Furness? You saw the thing fall, didn't you? Now, if you'll be so good as to show us where—"

"You'll find it all right," said Furness. He pointed to the flashing light against the dark sky. "Still, I'll come with you."

"I don't like it," said the inspector at last. "It's out of my province. All I can do is place road blocks and post a guard. Meanwhile, Mr. Furness, we'll go back to the station and put through a call to the military—"

"Or the Air Force," suggested Furness.

"Yes. Might be more their cup of tea than anybody's."

They got into the car, sat in silence while the driver took them through the streets of the little town to the police station. As they entered, the desk sergeant got to his feet.

"I know it's no concern of ours, sir," he said, "but there've been nothing but telephone calls from householders complaining about interference on their radios . . ."

"It's all part and parcel of it," said the inspector. "Put a call through for me to Wainham, will you? I want to speak to the officer in charge—Group Captain Boyle, isn't it? Anyhow, get him for me."

The call wasn't long in coming through. The inspector told his story, then Furness was called to the telephone to tell his. Welsh went back to the instrument then, talked for a few more minutes before hanging up.

"Back to Hanman's Wood, Mr. Furness," he said. "The Group captain's sending a couple of experts here by helicopter."

Furness stood with the inspector and watched the helicopter coming in. The light from the crater caught it, pinned it against the black sky like some huge, silvery insect in a showcase. It came in slowly, carefully, grounding at last about fifty yards from the thing from the sky. Two dark figures tumbled out hastily; as soon as they were clear of the aircraft it lifted again, flew away in the direction of Wainham.

Furness and the inspector walked up to them.

"I'm Inspector Welch," said the police officer, "and this is Mr. Furness. He saw the thing come down."

"My name is Brown," said the taller of the two airmen. "Wing Commander Brown. This is Squadron Leader Kennedy." He began to walk towards the crater. "You saw the thing come down, Mr. Furness. Did it seem to you to be a rocket?"

"No," said Furness slowly. "There didn't seem to be any exhaust. It seemed to behave—until it hit—like all the meteorites, the ones that have reached the Earth's surface, that is, I've ever read about—"

"It's certainly not behaving like one now," said Brown. "Have you got the goggles, Kennedy? There's a couple of spare pairs, Mr. Furness—you and the inspector had better have one each—"

The polarized goggles helped. It was possible, now, to look directly at the glowing ovoid. The four men stumbled over the rim of the crater, walked cautiously down to its center. Furness was surprised that there was so little heat, realized that the thing, now, must be barely warm.

"No sign of a venturi," muttered the Wing Commander. "Any joy from the Geiger counter, Kennedy?"

"No."

"I suppose you've a field telephone rigged, inspector. We were going to use our walkie talkie, but there's too much interference from this thing . . ."

"A field telephone—" muttered

the inspector. "I thought that you gentlemen—"

"Oh, well, if it goes up we all go up together, and the world will never know what we've done to earn our posthumous VCs— Got your tape handy, Kennedy? Four foot six, you make it, by three feet— Hm-m-m. Noisy brute, isn't it? Much more of this confounded whistling will give me a really vile headache—"

"Is that lettering on the side of it?" asked the inspector suddenly. "It's very worn, if it is—"

"You're right, inspector. Could be Russian? No. But it looks almost familiar, . . . Almost—"

"That symbol there could pass for the Greek letter μ ," said Furness.

"It could, at that," admitted Brown. "Well, inspector, I don't think that there's any danger of twenty square miles of countryside being wiped out by an atomic explosion. All the same, keep your road blocks up and, whatever else you do or don't do, chase the small boys away from here. They'll be round in the morning, never fear."

"What are your intentions, sir?"

"Oh, Squadron Leader Kennedy and I will stay around to find out what we can. The helicopter will be back and forth a few times with more gear and all the rest of it. Then— Well . . . I have an idea that this affair is going to finish up at a very high level. Oh, Mr. Furness, the inspector will know where to find you, won't he?"

"Within the next two weeks," said Furness. "Not after. My leave will be up by then."

"R N.?"

"No, Merchant Navy."

"Thanks anyhow, Mr. Furness. We'll let you know if we should want you. Meanwhile—don't talk about what you've seen."

The police car took Furness to his parent's home where, by his refusal to answer the questions of his father and mother, he conveyed the impression that he had witnessed either the beginning of a long-range rocket bombardment or the arrival of the advance guard of the Martians.

The following day Furness saw the thing from space for the last time. He was eating a belated and leisurely breakfast when Welsh called for him.

"Better get dressed quick, Mr. Furness," said the inspector. "There is all sorts of high brass out at the site. They want to hear you say your piece."

"I want to finish my toast," said Furness.

"Does it mean war, inspector?" asked Furness' mother anxiously. "With Jimmy at sea—"

"I don't know what it means, madam," replied the inspector. "I can tell you this—that rocket, or whatever it is, never came from either Russia or America. And it's not one of ours—*Please* hurry, Mr. Furness."

"All right," said Furness. He

wiped the marmalade from his lips, threw down his napkin. With a visible effort the inspector restrained himself from following him upstairs. Furness, submitting to the excitement that he had not shown in front of the police officer, hastily got out of his pajamas and dressing gown, climbed into flannel slacks and a sweater. When he came down again Welsh was still assuring Mrs. Furness that a shooting war was not imminent.

The two men left the house, climbed into the car. The driver took them to the site at a speed which would have earned an ordinary citizen a stiff fine. Furness was amazed at the crowd of men and vehicles around the crater. He saw the uniforms of all three British services as well of those of the American Air Force.

A sentry challenged them as the car drew to a halt. The inspector barked a few words to the soldier, who replied, "Go right through, sir. You'll find the professor at the bomb site."

Welsh and Furness made their way through the crowd. The crater itself had been kept clear, only three men, civilians, were in the center of it, standing by the strange ovoid. This, Furness saw, was still glowing, still flashing, but—it may have been the effect of the daylight—dimly. It seemed that the high-pitched whistling was much fainter, too.

The inspector approached the more elderly of the three men, saluted, said, "Mr. Furness, sir."

"Oh, yes. Thank you, inspector."

Furness looked at the scientist, recognized the upstanding brush of white hair, the thin, lined features. It was a face that he had seen often in the pages of the illustrated press.

"Ah, Mr. Furness— You saw this . . . ah . . . *thing* land, I believe?"

"Yes, sir."

"From which direction did it approach?"

"From the east, sir. I was looking towards Jupiter at the time, and it first appeared just a few degrees below the planet."

"Ah. An amateur astronomer?"

"No, sir. A professional navigator."

"I see. Now—"

"Professor!" yelled one of the other two men. "Down! Something's happening!"

Furness, from his prone position, heard a sharp crack. Cautiously, he lifted his head, looked towards the ovoid. It had fallen apart, into four neat segments. A white mist, slowly dissipating, hung over the center of the crater. The sailor got to his feet, looked down into the opened canister. There was the gleam of yellow metal there, and there were sheets of what looked like paper.

One of the scientists was already examining this strange treasure. He turned to Furness, a golden disk on the palm of his outstretched hand.

"Coins," he was saying. "Coins. Look!"

Furness took one of the gold pieces, examined it curiously. On one side there was the head of a

man, helmeted, on the other was a galley, a bireme.

"Greek?" he muttered. "But—"

The professor pushed him to one side.

"Never mind the money, Burgess," he snapped to his assistant. "That won't blow away. The papers, man. The papers!"

"But what's the language?" demanded Burgess of nobody in particular. He was waving one of the paperlike sheets in front of his face. "I thought at first that it was Russian. But it's not."

"Gentlemen!"

Furness, with the three scientists, turned to face the new arrival. He was, obviously, somebody. His black jacket and black Homburg hat were like a uniform, and there was the Royal cipher on his brief case.

"Gentlemen," he said again. "I must insist that these . . . pieces of evidence be removed at once to Whitehall." He looked at Furness. "I must insist, too, that all unauthorized personnel leave this site. Inspector!"

"Sir?"

"See to it, will you?"

"That means you, Mr. Furness," said the inspector apologetically. "All right. I'll see that you're taken home."

For the remainder of his leave Furness went through every newspaper every day to learn more, to learn something, of the mysterious missile. Most evenings he would meet Welsh in the Rose and Crown,

would try to pump the inspector about what, if anything, had been discovered—but the inspector knew as little as he did, knew only that the affair had passed from the hands of the physicists into those of the experts on languages.

Furness never mentioned the coin that he had, inadvertently, slipped into his pocket. He carried it with him always as a good luck piece.

Standing on the boat deck, by number three hatch, the archaeologist saw the Third Officer walk to the wing of the bridge. What he was carrying was, indubitably, a gin bottle. The Third threw the bottle out and away, watched it until it fell into the water well clear of the ship's side, then returned to the wheelhouse.

"Really, Chief," said the professor, "your junior officers go altogether too far—"

"What do you mean?" asked the Chief Officer.

"Drinking on watch. I saw the Third dumping the empties just now."

"It was an empty all right," said the Mate. "But it wasn't emptied on the bridge. It was one of mine, as a matter of fact. And it had a message in it."

"I'd no idea that the Twentieth Century was so romantic. Pirates? Buried treasure?"

"No, professor. Just date and time and position of dumping. We do it for the Hydrographic office. It gives 'em data—if the bottles ever

are picked up—for their current charts and such. Drift, and all that."

"I see," said the scientist. "It reminds me rather of a queer business I was mixed up in some years ago—it was near Wainham, the Air Force Station, you know. It—" He paused. "I'm not sure that I can tell you. It was all very much Top Secret at the time."

"Near Wainham—" said the Chief Officer slowly. "Would it have been a sort of guided missile from— Outside?"

"I'm sorry. I can't tell you."

"Come up to my room," said the Mate. "We'll start to empty another gin bottle, and I'll show you something."



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He led the way up the ladder, into his cabin. After he had seated his guest he opened his wine locker, took out the necessary bottles and glasses, poured two drinks. He went to his desk, then, pulled out a drawer, took from it a small, gleaming object. He handed it to the archaeologist.

"Did they show you any of these?" he asked.

The scientist looked at the coin—at the helmeted head, at the bireme.

"How did you get this? It can't have all been a hoax. Surely not—"

"I saw the missile land. Then I was there at the site . . . Sir Humphrey Williams, although he wasn't Sir Humphrey then, had sent for me to tell him all that I'd seen when the thing came in . . . when it broke open. One of his assistants handed me this coin, and then some cove from one of the Ministries took charge and I was hustled away pronto. I never found out what it was all about."

"Neither did they," chuckled the archaeologist, "until they thought of calling in those more concerned with the past than with the future. Oh . . . it was tough. I had to work back from the comparatively modern Greek of Homer. Grimm's Law

came into it, of course—but you wouldn't know anything about that. I had to make allowances for periods of absolute savagery during which only a handful of scholarly priests kept the written word alive."

He held the coin on the palm of his left hand, pointed to the script around its circumference with a gnarled forefinger.

"D'ye know what this says? I'll translate for you. REPUBLIC OF ATLANTIS, YEAR THIRTEEN HUNDRED AND FOURTEEN—"

"And what about the papers?"

"You've already told me, Mr. Furness."

"I've told you?"

"Yes. Date and time and position—and the promise of a reward if they were posted back to Port Anachreon without delay. And a lot of stuff altogether over my head about etheric currents and such—Oh, it had the physicists crazy, I can tell you—"

"But the ship," said Furness intently. "The ship—"

"Let me see, now . . . Atlanta . . . Bound Sol III to Procyon IV—"

Furness refilled the glasses.

"Gin bottles are cheaper," he said. "And they don't take such a long time getting there."

THE END

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THE REFERENCE LIBRARY

BY P. SCHUYLER MILLER

ACROSS THE TRACKS

I think we have to accept the fact that to the critical wing of the literary world, the whole phenomenon of science fiction is something that is taking place on the wrong side of the tracks. There have been slumming excursions to look at us, and the folks from Forest Avenue and Van Brandt Boulevard have been mightily puzzled by the healthy, happy community life they saw—and couldn't understand. At the moment, they've retreated and turned their backs again . . . but some of them have been infected

by a virus from down our way. Or maybe one of our boys was up there caddying at the Country Club, and one fine summer night he and . . .

To stop mangling metaphor and get down to the business of the month, a new crop of books with science-fiction themes and to some extent science-fiction treatment has appeared from the literary preserve across the tracks, during the last few months. The authors and publishers would be horrified to know that the collectors, at least, are going to look for remaindered copies and stash them away with Doc Smith, Edgar Rice Burroughs and Ray Bradbury.

But science fiction they are, and they are worth your attention. One, in particular, has my vote as the best SF novel of 1957, until someone beats it.

The first of the three to appear, by a slight margin, is "The Curve of the Snowflake," by W. Grey Walter, an English physiologist and pioneer in electro-encephalography. The United States edition was published last fall by W. W. Norton, contains 282 pages, and costs \$3.75 new. This cannot possibly escape the stigma of being science fiction, for it uses a collection of classic SF themes, in a SF manner. Many able critics to the contrary, I don't feel that it does it very well.

The title of the book derives from its gimmick: a three-dimensional expansion of the two-dimensional "snowflake" curve, which bounds a finite area by an infinitely long line. It is the author's postulate that such a solid can be made to travel in time. My quarrel is that he has tried to do too many things, and wound up with a rather lumpy porridge.

As it begins, and begins well, "The Curve of the Snowflake" is the story of a group of talented scientists and promoters who get together in the late '40s in an association which gives them almost unlimited room to expand on their ideas, without the hampering purse-strings and security-walls of government or industry. Then their leader and principal genius seems to or does leak information to Russia, and shortly afterward disappears from a kind

of house-arrest on the Scottish moors. At this point, instead of carrying on with the story, we change themes and read a narrative supposedly brought back from 2056 in the "snowflake" time-machine by the missing scientist and the friend who may have helped him escape. This never really solves the mystery of Punch Andrews' defection and disappearance; rather, it adds new, unanswered questions of immortality, and seemingly is there solely to show the changed society of a century hence.

Now, Margaret Mead, one of our best known and most vocal anthropologists, took a roundhouse swing at science fiction in an address to the American Association for the Advancement of Science, held Christmas week in New York. Her topic was "Toward More Vivid Utopias"—she was speaking before Phi Beta Kappa—and if I understood her correctly from 'way out in the hall, she had one basic and legitimate complaint. Science fiction, she said, has by and large been content to create heavens and hells in the imagined future, but hasn't taken the trouble to extrapolate real worlds. In other words, we've been pointing with horror to what can happen to society, or painting in garish colors the utopias we'd like to see, but we haven't used our scientific knowledge of our race, our society, and our world to work out a logical picture of what the world *will* be like in a hundred or a thousand years.

I can't decide whether Dr. Walter is prognosticating or utopiating in the picture of 2036 that he gives us in his log of the *Snowflake*. There are elements of both, or of all three—and the injection spoils the pace and style of the book as a novel and a story, without ever becoming very interesting in its own right. It's a well-written book of English style and pace, but for my money it never quite makes up its mind where it's going or why.

"Doubting Thomas," by Winston Brebner (Rinehart & Co., N. Y., 1956, 210 pp, \$3.00) is something quite different: an unabashed glimpse of a future hell ruled by a vast computer and its human arm, The Agency. Thomas, the protagonist, is well up in the hierarchy—a District Agent, responsible for executing the ruthlessly "impartial" judgments of the invisible computers, which by definition can never be wrong. But once a year Thomas slips into the costume of The Clown and becomes human in his anonymity, bringing laughter and warmth to the very people to whom he has been harshest. Until one night, after ten years, the disguise slips—the people of the streets refuse to believe that one person can be both Scourge and Clown—and Thomas is brought up for the judgment of his own Machine.

In mechanism this is, of course, standard SF fare; what is different is what the author has tried to do. With notable exceptions, the essence

of magazine science fiction is melodrama, cunningly contrived and spun out with peril heaped on peril and mystery behind mystery. In the poorer jobs, the other-world or other-time or other-society setting is merely a colorful backdrop; in the good ones, plot and situations grow out of a fully realized world.

The real world, which serious fiction tries to mirror or to interpret, is a place where unbelievably complex people are concerned with relatively simple problems, which become crucial and dramatic only in terms of their personalities. In the world of most science fiction, very simple people must cope with very complex situations: what they do and how they do it is the important thing, rather than what happens to them.

Thomas and his doubts, and what he does to alleviate them through his clowning, and what they eventually do to him and to his society, are the important thing in Mr. Brebner's novel. Through Thomas, he is saying certain things about Man's spirit and how the humanity in Man can surmount any machine if it will. The melodrama of the manhunt through the streets, of Thomas' judgment in the place where he has judged, are the means, not the end.

And the reaction of fantasy on five very real, very complex, very different people is the theme and purpose of Rachel Maddux' massive novel, "The Green Kingdom," published just after the first of the year by Simon and Schuster (361 pages;

\$100—and worth every cent). This is a *tour de force* in every way. The author, in her hidden valley or crater in the Rockies, open only for a few minutes every ten years, has created an utterly strange, utterly real world that is only vaguely related to our own. Its plants, its animals, its very geology is alien—and believable.

Into the Green Kingdom go five strangely assorted people. Justin Magnus is a sixty-year-old pianist and composer, whose wife has died after years of insanity. His grandfather visited the Green Kingdom and brought back a map and a legend which nobody believed. Arthur Herrick is a young printer with a strange, naïve vision of drawing out the essence of Man through the accumulation of the "Human Records"—daily journals which will encompass everything in human experience and preserve it for the future. Erma is his young wife, acquiescent to his vision yet never sharing it, most normal of them all yet a cause of their destruction. Joe Roberts is the pragmatist, Herrick's partner, the man who can fall on his feet but who knows very little about people. Gwendolyn is his picture-prett, wholly self-centered fiancée.

They go into the Green Kingdom, after we have had the length of many short novels to become acquainted with them. They are trapped there for ten years, in a natural paradise where food and shelter are always available, where there is almost nothing to fear. But they have

brought their own ingrown fears into the valley with them, and the rest of the story follows the conflict of their personalities with each other and with the strange world they are in. There is plenty of drama and melodrama, but it is drama of character, and the change of character as it is molded by the fantastic.

A less skillful writer would have made this dull, preachy, unbelievable, tedious—but Rachel Maddux is a very skillful writer who does not feel that she is condescending when she uses the medium of fantasy. The result, to me, is a hauntingly memorable book.

We have, all of us, long insisted that science fiction and fantasy give a writer more scope, more elbow-room than any other form of fiction. That mature, serious novels can be written in our genre we all know, and two of the three books I have just described add to the cumulative evidence; the third fails when the mechanism of fantasy begins to get in the way of the human story, so that the book never really establishes itself as anything, novel or entertainment. If the reception of these books among general readers is good, it's a sign that a little of the quality from our side of the tracks is getting across and disturbing the elite. Imaginations are stirring again, as they haven't for a generation or more. And eventually the tracks will be pulled up and there'll be no artificial boundary between the kind of fiction that is rated "serious" and produced by "novelists," and the

kind of thing that mere "writers" do for this and other good science-fiction magazines.

* * *

For your information: the Pittsburgh postoffice box that I kept for the convenience of this department turned out to be an inconvenience. Henceforth I will unabashedly use the address that's in the phone book: 4803 Centre Avenue, Pittsburgh 13, Pa. I am the world's worst correspondent, but I appreciate your reactions and comments even though you'd never find out from me. On occasion, however, something does get me started, and then you're likely to get something the length of this department.

One more thing: This is written in January, and I have seen no information on the 1957 World Science-Fiction Convention, which will be held in September, in London. The hope is that enough American fans will be able to make the trip to charter a plane, cutting the one-way fare in half. If enough will return at the same time—say after two weeks abroad—the same deal can probably be worked out for the trip back. *

There will be a certain amount of red tape: passport, shots, luggage allowances, currency restrictions, and what have you. I'm hoping that someone, probably in New York, will undertake to assemble all the pertinent facts and hints and make it available through one of the fan publications and in the magazines,

in time to be of help. Red tape takes time to unravel; don't wait too long to start, or you may not get to London before 1958.

————

PREDICTIONS, edited by John Durant.
A. S. Barnes & Co., New York
1956. 151 pp. \$3.00

Science fiction, periodically, takes credit for the accuracy of its predictions, but if any models are being passed around, they belong to the cartoonists. And John Durant has put in an imposing brief on their behalf with this amusing and amazing collection of their work since 1856.

Most of his selections, and the most accurate hits, come from the humor magazines—*Life*, *Judge*, *Puck*—at the beginning of the century. Not only had printing techniques advanced to the point where magazines and newspapers could do justice to good drawing, but the same something-in-the-wind that produced a turn to conjecture in fantasy and science fiction, seems also to have affected the artists. They played with the same ideas, and in about the same ways, that the writers did.

In fact, the cartoonists were badly wrong in only one field: their predictions of what aircraft would look like. There was no science of airfoils in their day, and their chariots of the sky looked—as did "Tom Swift's" early inventions—like the result of miscegenation between bal-

loons and box kites. (Recalling my own reading in the middle '20s *Boys Life* and the *American Boy* were just beginning to advertise radically new "monoplanes" as the latest for model-builders; so maybe the artists weren't so far off at that.)

The themes the cartoonists developed have all had their place in science fiction, and still do: skyscraper cities, aircraft, automobiles, the onslaught of advertising, television, feminism and its growth into matriarchy, nudism. In this selection, at least, the interplanetary theme is not prominent (one *Life* cartoon from 1906—when *Life* was a humor magazine with no relationship to the present picture-journal—shows a plane crash on an asteroid). A photograph in today's *Pittsburgh Press*, of a local parkway interchange with eleven feeders and levels, is even more complicated than one *Life* satirized in 1913, and back in 1908 the same magazine had foreseen today's hot-rod teen-agers.

These cartoons were, of course, social commentary, as ours are today. Mixed with the more general kind are some which show the progress we have made in our attitudes. There are still strong elements among us playing the old tunes about "real Americans" being run out of the country by immigrants . . . racist jokes and libels . . . "keep-them-in-their-place" attacks on labor or intellectuals or what have you. But we've grown milder, and today's newspapers and magazines would never be so crude as to print some of the

cartoons that were normal thirty years ago.

This is our day as it looked from the past. How well are we predicting the days of our grandchildren and great grandchildren?

————

THE PAWNS OF NULL-A, by A. E. van Vogt. Ace Books, New York. 1956. 234 pp. 35¢

It's been nearly ten years since A. E. Van Vogt's sequel to his classic "World of Null-A," published as "The Players of Null-A," was serialized here in *Astounding Science Fiction*. I've never understood why nobody, during the boom days just past, put the story between hard covers. Now Ace has given it to us as a paperback, with a new title—and the answer seems to be that Van Vogt wanted to do a lot of rewriting.

I'm sorry that my 1948 magazines aren't where I can get at them to make a comparison. Since the story originally appeared, Van Vogt has been up to his chin in West Coast Dianetics, and has, I'm told, been studying orthodox psychology intensively. I suspect that a chapter-by-chapter revision would show clear evidence of this work, because it seems much more coherent than I remembered the original.

Gilbert Gosseyn, the multiple supeman of "The World of Null-A," is now involved with the "Players" who were manipulating him from

behind the scenes in the first book. His neo-Aristotelian powers and spare brain are operating outside the Null-A, semantic-based culture of Venus, and carrying him in and out of the conflict for the galaxy, waged between Enro's "Greatest Empire" and the smaller Galactic League. And another Player—possibly the hazy being known as the Follower—is jockeying him around in a way he can neither understand nor control. As in most Van Vogt books, the situation becomes more complicated before it becomes any clearer.

The revision, as I've said, seems to me to have clarified a story that was once pretty confusing, even compared with its predecessor. I'm not sure that all the feeling of immense behind-the-scenes significance, which Aldous Huxley has proposed as a key factor in fantasies of this kind, has survived the cleaning up. Perhaps in books of this kind, as in Doc Smith's yarns of the Lensmen, the reader's duty is just to let go and be carried along by the current. He is likely to choke here and there, and he just may drown, but it's easier on the nerves and muscles than trying to fight your way through.

TALES FROM THE WHITE HART, by Arthur C. Clarke. Ballantine Books, New York. 1957. 151 pp. 35¢

Dirce Archer tells me that the

English school of science fiction is well into the university stage, and Arthur Clarke, in this new collection of reminiscences, gives away the secret: every English writer worth his salt spends Wednesday nights in the White Hart pub, listening to Harry Purvis.

There can be very little doubt that H. G. Wells frequented the White Hart in his day: I suspect it was the real setting of "The Man Who Could Work Miracles." Purvis, though a scientist of extremely broad interests, has the knack for attracting persons and events that we have also seen in Lord Dunsany's friend Jockens, and in P. G. Wodehouse's Mr. Mulliner—it's never quite clear whether Gavagan or his bar was the focus of the supernatural in the Pratt-de Camp chronicles. The result—as you already know if you've encountered such adventures as "Armaments Race" or "What Goes Up" or "The Ultimate Melody" in various United States magazines—is pure joy.

If you take the carping attitude that not only is Purvis a congenital liar, but that there is no White Hart, and the whole thing a fiction of Mr. Clarke's vigorous imagination, then here is a major work of art. Themes—even good themes—that might have been strung out into ten or twenty thousand words are handled with economy and ingenuity in a couple of pages. The chinks in the armor of seemingly impenetrable clichés are spotted and penetrated with the deftness of an old hand at

darts. Fredric Brown's occasional vignettes are probably the closest parallel in the American language, but those are openly stunts and these are perfect little tales, as delicious collectively as they were individually. Let's hope that now that Drew and his choice Wednesday clientele have moved to the Sphere, there will be other volumes to come—maybe from John Christopher, John Beynon, William Temple, and others of that select group, who may have heard stories that Clarke missed.

TOMORROW REVEALED, by John Atkins. Roy Publishers, New York. 1956. 254 pp. \$4.00

This is a pure *tour de force* whose price and special nature will probably mean that you buy it off a remainder table in a few months or a year. Since there is no plot and no TV or film potential, there is not likely to be a paperback edition (Roy seems to have imported the printed pages of the English book).

The idea is one I used years ago in a guest editorial for—I think—*Startling*. It was called "Counterfeiting a Golden Age," and suggested the perplexity of future historians who try to reconstruct the history of our times from a file of science-fiction magazines. And the narrator of "Tomorrow Revealed," who has blundered on a library somewhere along the upper Nile in 3750 A.D., has set himself exactly that job: re-

constructing some eighteen hundred years of the Dark Ages of his own time from the books of H. G. Wells and George Orwell, Ray Bradbury and A. E. van Vogt, C. S. Lewis and Wilson Tucker, Aldous Huxley and Vargo Statton.

The sources he has used are all English—Bradbury's "Martian Chronicles" is cited by its British title, "The Silver Locusts," and one of the key references, Robert Graves' "Let the Northwind Rise," has its original title, "Seven Days in New Crete"—and a few may be unfamiliar. But by and large, most reasonably well-read science-fiction devotees should be able to appreciate the ingenuity with which the author has woven together and reconciled the hosts of conflicting elements in his "sources," to produce a consecutive, consistent "history" of the next two thousand years.

Most of H. G. Wells' accounts, for example, are badly out of phase with the "histories" written half a century after his time: this is explained by pointing out that Wells lived in an era—that of "1984"—when it would have been politic to back-date the Martian invasion and Cavor's visit to the Moon, and that other details of both chronicles were adjusted to satisfy the temper of the times. The Vitons of Eric Frank Russell's "Sinister Barrier" become Earth's wicked *eldritch*, described by C. S. Lewis in his "Out of the Silent Planet" and "Perelandra." And so it goes. I have counted some fifty seemingly irreconcilable books

ASTOUNDING SCIENCE FICTION

woven into this amazing history of the future, and other authors—Kuttner, del Rey, Blish, Kornbluth—are mentioned in passing when their short stories contribute to the framework.

The closest parallel is, of course, Stapledon's "Last and First Men"—which is so nonconforming to the rest of the canon that it is passed off as "fiction." The style is matter-of-factly narrative, as it should be. And, in the doing, Mr. Atkins has shown how extensively the minds of science-fiction writers have traveled along the same paths in their projection of Man and his society. *Slaymy* may not be a literature of prophecy, but it has written its own formula for the future, which John Atkins has translated back into words.

REPRINT TABLE:

MARTIANS, GO HOME! by Fredric Brown. Bantam Books, New York. 1956. 35¢. The side-splitting novelette, first published here, blown up into an even better book.

TOMORROW AND TOMORROW, by Hunt Collins. Pyramid Books, New York. 1956. 35¢. The

p-b publisher nowhere tells you that this excellent novel of a mad future appeared in hard covers just a few months ago as "Tomorrow's World." The original, shorter version was in *If* in 1954 as "Malice in Wonderland," by Evan Hunter.

21st CENTURY SUB, by Frank Herbert. Avon Publications, New York. 1956. 35¢. This is the third change in title for one of the best novels of the past or any other year. It was "Under Pressure" as a serial, here in ASF. The original book was called "The Dragon in the Sea." If you've missed it before, grab it now.

THE UNQUIET CORPSE, by William Sloane. Dell, New York. 1956. 25¢. By changing the title and calling it a mystery, that classic of nearly twenty years ago, "The Edge of Running Water," can be sold for 25¢ instead of 35¢. Strange are the economics of publishing!

THE AGE OF THE TAIL, by H. Allen Smith. Bantam Books, New York. 1956. 25¢. The hilarious, dead-pan account of what will happen to our culture when the human race begins to grow tails.





BRASS TACKS

Dear Mr. Campbell:

I have been pondering the challenge you threw out several months back: how do you fix up a thinking machine to accept incomplete, erroneous data and come up with the right answer?

I believe that in reaching for the answer I may have also gotten a clue on that age old problem: what makes people so cursed about accepting new theories and ideas?

It seems to me that the adult human thinking machine accepts a new datum by giving it a classification and matching it into its proper category. For example: objects which fall from the sky are (a) rain, sleet, snow, and other forms of precipitation; (b) dust, feathers, and other objects carried aloft by the wind or by living creatures; and (c) arrows, bullets, and other objects which have been hurled into the air by man.

This object is alleged to have fallen from the sky, and it is too large to admit of (b) or (c) above. Therefore, either it must be a hailstone or it did not fall from the sky. It is not a hailstone because hailstones (a) are cold, (b) melt when warmed, and (c) turn into clear water after (b). Therefore there are no such things as meteorites. Tell Friedrich to get on back to his plowing; anybody can make a mistake.

As long as the recognized categories are reasonably complete, the method usually works. False data is rejected and missing data interpolated. It seems to me, therefore, that this chain of reasoning leads to not one but two goals: a process to adapt the classification-category process for cybernetic application, and a psychological attack on the same process in humans to make it more adaptable so that our next Galileo won't

have so much trouble with his telescope.—Lawrence A. Perkins, 1939 Kassingbower Road, Augusta, Georgia.

You should see the trouble Hieronymus and his associates are having with their periscope!

Dear Mr. Campbell:

I have just finished the November issue of *Astounding Science Fiction*; I always read the editorial first, and I am impelled to write to you because of some of your remarks on patents. If I may be blunt without intending to be rude, you appear to have some misconceptions about patents, and since you do keep talking about them, I should like to assist you to brush up a bit on some aspects.

I now remember only imperfectly that Hieronymus affair to which your editorial makes reference, but I recall that when I read it I was rather irked about the patent procedure which was supposed to be requisite. It is entirely incorrect that an inventor must argue his case in person before the Patent Office; it is not impossible to do so, but it is not encouraged. Let me quote in full Rule 2 from the *Rules of Practice of the United States Patent Office in Patent Cases*:

2. *Business to be transacted in writing.* All business with the Patent Office should be transacted

in writing. The personal attendance of applicants or their attorneys or agents at the Patent Office is unnecessary. *The action of the Patent Office will be based exclusively on the written record in the Office.* (Emphasis mine. Interviews are not recorded.) No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

Interviews *can* be had, but are on an informal basis, and are mostly between the examiner and the attorney—very rarely the inventor. It is dangerous to allow an applicant to participate in an interview; it seems impossible to put over to the client the idea that it is necessary to reply only to the examiner's specific objection, absolutely no more. An inventor always wants to discuss his brain child in full, and will only end up giving the examiner a lot more material to object to. He is also apt to get pretty salty about the examiner's stupidity in failing to see a specific point the way he does, and will cut his own throat. (See Rule 3: *Business to be conducted with decorum and courtesy.*)

There are probably two chief reasons for an interview. One is that the attorney discerns that the examiner has got hold of some misconception concerning the invention, either through a faulty disclosure in the first place, or through some private mental set of his own. Such a mis-

conception may be very difficult to shake by correspondence, because you don't know exactly what it is, but can often be cleared up in a few moments of conversation.

The other main occasion for interview is when the attorney divines that the examiner is willing to allow some claim, but not in the form so far presented. This is a very delicate situation, and one in which you certainly don't want the inventor blundering about. It calls for intuition and skill on the part of the attorney to detect it in the first place; previous employment in the Patent Office helps a good deal. The examiner's official action tells you what he considers to be wrong with your claims, but not what to do about them. He is, after all, counsel for the United States, not for the inventor, and he is naturally very chary of offering any suggestions which will forward the opposing side. The most you can expect is not even what would be called a hint, but the revelation of an attitude, which the skillful attorney will pick up. The claims can then be discussed at an interview, which is not transcribed for the record. When the attorney presents his revised claims in writing, they are merely ticketed as those which have been previously discussed in interview, where it was indicated that they were of acceptable form.

With regard to models and specimens, I quote again, this time Rules 91—93:

91. *Models not generally re-*

quired as part of application for patent. Models were once required in all cases admitting a model, as a part of the application, and these models became a part of the record of the patent. Such models are no longer generally required—the description of the invention in the specification, and the drawings, must be sufficiently full and complete, and capable of being understood, to disclose the invention without the aid of a model—and will not be admitted unless specifically called for.

92. *Model or exhibit may be required.* A model, working model, or other physical exhibit, may be required if deemed necessary (by the examiner) for any purpose on examination of the application.

93. *Specimens.* When the invention relates to a composition of matter, the applicant may be required to furnish specimens of the composition, or of its ingredients or intermediates, for the purpose of inspection or experiment.

I cannot say offhand when the requirement for models was dropped. It is not something which happened since I began to practice, it is something which occurred before I was born. It is extremely rare for the examiner to call for a model of an invention. I have no personal knowledge of its occurrence, either in my own practice or that of my acquaintances. It is not unusual to require

specimens of compositions, but neither is it common. I cannot say how frequent such a requirement is, but my guess is that it is less than ten per cent of such applications. The Patent Office simply hasn't the space for such stuff, and they haven't the personnel, the equipment, or the money to test it. About all they can do is look at it, and if specific tests are required, the applicant must have them done and submit affidavits of the performance.

The examiners are really much more open-minded than you give them credit for. The fact that something is stated in textbooks to be impossible does not prevent you from getting a patent on it, if you actually *do* it. Invention is by definition something that has not been done before. Although it is not a point which I am prepared to prove, I have the feeling that practically all textbooks, over the centuries, are eventually proved wrong on almost everything they say, especially if they say it can't be done. As an interesting aside, I was often amused by many physicists I came in contact with during my own work in atomic energy during and after the war. Some of them used to scoff at science fiction, snorting that such things were impossible, yet every day they were personally doing something which had been labeled impossible, and had been the subject of science fiction only two or three years previously. Just for instance, would you know how to produce a straight hole through a solid wall four feet thick,

which hole could then be waved around to point in the direction you wanted, without sacrifice of wall thickness? I wrote a patent application on one. It didn't take atomic energy to do it, either; it could have been done a hundred years ago, if anyone had needed to.

As for amalgamating iron, if anyone invents a process for doing it, it would be patentable, no matter what textbooks say, providing only that it is new.

It is not necessary, as implied by your editorial, that a patent application explain *why* an invention works, but only *how* it works—functionally how, that is, so that it can be used. An inventor may be entirely ignorant of the laws of nature on which its operation rests, and still get his patent. It is a good idea, however, to explain *why*, if you know; it makes a stronger patent and allows broader claims. And sometimes, when you don't exactly know, you make some guesses, hoping that they will turn out right; if they do, it prevents a subsequent applicant from getting a patent on that process, because of your prior disclosure.

I haven't seen Orton's patent, but I am sure the rubbish you found in it was not required by the British Patent Office, but was included on his own initiative. The same thing happens in American patents. The practices of the Offices of Britain and the United States is not fundamentally different; I file the same specification for British and Canadian applications as was filed in the

United States, with only some purely formal changes on the first page, and a different set of claims, the foreign practice requiring the claims in different form from the United States.

The great body of argument in prosecuting a patent application is not in convincing the examiner that it will work, which is more or less taken for granted. In fact, I have seen examples of patents on devices which will not work, if you analyze them. The inventor has not actually made anything, or he would have found it out, but has only drawn pictures and written about them—called "paper patents." The argument is in convincing the examiner, first, that it is new—that is, has not been anticipated—and second, granted that it is new, that it rises to the dignity of invention.

It is often supposed that the Patent Office makes a keen analysis of an application, compares the invention with all similar devices patented and unpatented, and then decides whether or not it is an invention. This might be the ideal, but unfortunately it isn't so; that's what you have to do. The Office gets only thirty dollars for the whole examination and prosecution of your application, and they can't exude much sweat for that. The examiner pulls out some patents on inventions that he thinks bear some similarities to yours, cites the numbers, and tells you that you have been anticipated. You buy the patents, analyze and compare them keenly, and present

your analysis and an argument that the similarities are in name or appearance only, not in fact, and that in any case they are completely overshadowed by the differences, and hence you have not been anticipated. If you are lucky, the examiner agrees; if not, he finds some more patents, and you have to do the same thing again; if you are even less lucky, he just doesn't accept your argument, whether he finds any more patents or not, and you have to re-argue the case in other terms, keeping in mind Rule 3: *Business to be conducted with decorum and courtesy*. This can go on a long time—for thirty-four years, in one case I know of.

Once you have conquered anticipation, you have to deal with his argument that your step forward in the art is only a minor one, such as anyone normally skilled in that art could have produced, and hence it does not have the dignity of invention, and the examiner cites a few cases in which this contention has been upheld. You look up his cases and argue that they are not applicable, and cite a few of your own in which the opposite view has been held, neglecting to mention that they are not applicable either.

Then you prepare whatever argument your fancy dictates on the nature of invention, quoting from case law, comic books, Plato, Astounding Science Fiction, and Baldwin's *Dictionary of Philosophy and Psychology*—have a look there under "Invention" sometime when you feel

the need of a little frustration to humble your spirit.

By this time your client is dropping in once a week and pounding your desk and threatening disbarment proceedings because you have not got his patent. You are able to shrug this off because, although you don't itemize it in your statement, you charge him at the rate of twenty-five dollars an hour for listening to this stuff.

The fact is, there simply *isn't* any definition for invention, and I don't see how there can be; you may be able to say what it is not, but you can't say what it is. In the broad general sense, invention is something which has not been done before, and which would not occur to the ordinary individual to do in a given situation. If you attempt to delineate a field, a procedure, a mental process, anything at all, even a mental state, within which invention is to lie, you automatically exclude the possibility of invention outside those areas, and that isn't cricket. No one knowing what the human mind may be capable of, you cannot say where invention may be found.

Well, supposing you are sufficiently glib and have finally overwhelmed the examiner by the mere poundage of your argument, and have resolved your differences over the form of the claims, you finally get a patent. You are treading on quaggy soil to say, as you did of *Osston's* patent, that it is valid. A patent is not valid simply because it has been granted. There is only a *presumption* of

validity attached to the issue of a patent, and this presumption, like any other, is rebuttable. A patent is truly valid only when it has been so adjudged by the Supreme Court of the United States—and very few which come before it attain that distinction. I can't vouch for the figure, but I believe it is something like thirty per cent, and those valid only in part, some of their claims, that is. A patent in which the Supreme Court adjudged all claims valid is a real rarity. A former Justice is credited—or discredited, if you like—with the remark, "The only valid patent is one which this Court hasn't been able to get its hands on."

Most patents don't get into litigation at all, of course, or the figure would not be even so high as thirty per cent. Patents of low financial value, and those in which validity appears shaky, are not taken to court. It is even possible to have a patent which is valid in one state and not in another; if infringement suits arise in different states and do not reach the Supreme Court, the several jurisdictions may arrive at different judgments. A further suit arising elsewhere may be taken to the Supreme Court and upset both the previous judgments, finding the patent valid in part, but a *different* part from that validated by the previous lower court.

Some inventions are not patentable at all because of their nature. The classes of patentable matter are

specified by statute. You may develop a process for crossing the cat with the dog—would that be a cog or a dat?—which is at least as much of an invention as crossing the plum and the peach, and more than the catalo, but it isn't a patentable invention because it doesn't fall within any statutory class of patentable subject matter.

A final remark on Patent Office procedure: an applicant is not required to be represented by an attorney; he may file and prosecute his application himself. But in view of what I have written—and that isn't the half of it, it is vastly more complex—do you think he'd better try? It has been done, and patents have been issued on such applications, but generally they are the next thing to worthless.

There are a couple of common superstitions concerning patent matters, although I mention them only as an aside, not suggesting that you hold them. It is widely believed that a person may make a patented device for his own use without commercial application, without infringing the patent. How this arose I don't know, but it has no basis in fact. The grant of a patent excludes *all* others from practicing the invention. It is true that if you make a patented paring knife in your basement workshop and use it in your kitchen, no one is going to do anything about it, even if you get caught; but you had better not try it with a hundred-thousand-dollar

color printing press, even if you only make your Christmas cards on it.

Many people believe that patent attorneys steal inventions from their clients, which idea brings only a raucous guffaw from attorneys. I suppose it may have happened—once, anyhow—but the truth is that the shoe is on the other foot; inventors would stuff attorneys to the eyebrows with inventions, if allowed. To the attorney in private practice hardly a week goes by without some prospective client wanting him to take a share in the patent as payment for his work in filing and prosecuting the application. It's always a share in the patent, too, not of the invention, so that if no patent issues you get nothing, although the invention might be profitable even if unpatented.

Attorneys rarely take up these offers; the client always wants extra service, and because he is getting it for nothing he feels that it isn't of much value, and is very likely to say so. Besides, the inventor always wants to control the exploitation; the attorney generally isn't a business man himself, and has no knowledge of whether the inventor is; most aren't, and would not make money even with a good invention. The attorney may not have capital to develop it, and obviously the inventor hasn't. The attorney doesn't know the market for a particular device, and the inventor wouldn't listen to him anyway; he usually

vastly overestimates the sales potential of his dingus and the price he can get for it, and underestimates the cost of producing it; he doesn't allow anything at all for the cost of marketing it. If an attorney takes a share of a patent for his work, he generally ends up with just a share of a patent—if one is granted.—Raymond Wallace, Registered Patent and Trademark Agent, 110 Llewellyn Road, Montclair, New Jersey.

The ultimate argument on workability of a claimed device is demonstrating it at work. The patent office does, I believe, demand working models of perpetual motion machines, and other violations of the second law of Thermodynamics. If an inventor has a device that the examiner sincerely believes won't work, and it's absolute nonsense, a working model may be demanded. Suppose someone invented the violin for the first time now, and sought a patent; a violin won't make music without a violinist. If a working model were demanded, a violinist would be needed to demonstrate that it did in fact make something besides horrible shrieks and groans. I gather it was something of this sort that led to Hieronymus demonstrating his working model. Agreed; demonstrations of working models are very unusual in patent procedure. That's why I thought the item worthy of mention.

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Dear John:

As you might expect, I've been amusing myself "playing the game" with Jim Blish's "Get Out of My Sky." His planetary system is quite interesting. To play fair, I suppose I'd better get my present crop of conclusions in to you before Part II comes out.

Two items I was unable to make sense of at all. During the eclipse, the unlighted part of Rathe was described as "spindle shaped." This seems difficult, with one of the illuminating objects at the zenith, one at the northern horizon, and the planet itself in the west. Also, the star cluster at whose edge the system lay was stated to outshine the white sun. At the distance I calculated for the latter, this would call for a cluster of similar stars, averaging a tenth of a light-year apart, five or six million light-years in diameter. I therefore omitted the cluster from consideration when I drew conclusions about the system which depended in any way on the planet's temperature.

I get a main-sequence A-type star, circled at slightly better than two hundred million miles by a red dwarf—and I *do* mean a dwarf—less than four per cent of its mass. The twin planets are stated to be in the following Trojan position. Their mutual orbit is not in the same plane as the binary orbit, but I couldn't decide how highly it was inclined, since I wasn't sure the eclipse expedition was anywhere near the planet's equator. Revolution is

direct in this orbit. The planets have a total mass approximating that of earth, and must have a period of about a month, which the inhabitants for no obvious reason divide into twenty-eight "days." The actual day coincides, of course, with the mutual revolution of the twins. Jim's use of "day" and "tomorrow" is a bit confusing.

Nesmet is sixty million miles further out, and would have a period of just under one and a half "years." (I thought of having a white dwarf for the primary, and "years" only a few days long, but the twin-planet system would have fallen apart. Besides, the white star was stated to have an extensive atmosphere.)

All the above comes from the stated distance and period of planet five, the fact that water is liquid on the twin planets, the semiannual eclipses, the given diameters and separations of the twin planets, and various stated things like shadow directions.

I assumed the "miles" given were our own. Figures were evidently in our own decimal notation rather than the duodecimal one of his characters, since the distance between the twin worlds was stated to be two hundred fifty thousand miles in one place, and a quarter of a million in another.

That seems to cover the deductions for now. Where have I goofed?—Harry C. Stubbs.

"The Game" is a legitimate activity of any science-fiction reader; it's just a little hard on any one au-

ther, since there is, somewhere among our readership, a top-flight expert in almost every namable science. On the other hand . . . it's interesting to see how little data need be stated to provide adequate material for describing a star-and-planets system.

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Dear Sir:

In reference to Mr. Yergen's letter in the February Brass Tacks: Naturally $-(i\frac{1}{2}) = i\frac{1}{2}$. For that matter $-(n\frac{1}{2}) = n\frac{1}{2}$ When n is any number real or imaginary. After all $n\frac{1}{2} = +x$ and $-(+x) = +x$.

Ignoring the fact that there are two square roots to any number is as old a mathematical trick for apparently proving the impossible as dividing by zero.—R. F. Acker, 1042 Michigan, Evanston, Illinois

Neat and complete solution. Another way of putting it is that, from the viewpoints of n^+ , $-in$, in , $-n$, and n are all equally valid roots. In that sense, they are equivalent and equal. Therefore, in that special sense, n does in fact equal $-n$, and n equals $-in$ also.



(Continued from page 7)

through a testing gate which rejects all children under four feet six inches, and then plot a curve for those that passed the test. Of course, we have fewer children now, but the new bell-shaped curve is displaced toward the right; the norm is higher. Now we use another testing gate that rejects all under five feet. Again, we can get a bell-shaped curve—displaced further to the right.

Evolution, by eliminating individuals unable to pass the test of staying alive in the face of disease attacks, accident threat, et cetera, keeps shifting the curve to the right—even if there are no mutations. With our little business of the children and the testing gates, we kept getting fewer individuals after each test; evolution isn't limited that way, because of constant reproduction of the ones who do pass the test of staying-alive-despite-pressures.

But suppose we have a testing gate that passes only ten-year-olds who are over eight feet tall?

The mathematician's bell-shaped curve extends to infinity in both directions; theoretically, then, there would be some small number of children over eight feet tall. It's an interesting theory, but the statistical process breaks down in practice. It's sort of like asking: "How large a population would be required to produce one hundred individuals of I.Q. three thousand, on the basis of presently known IQ distribution curves?" After all, with a galaxy to

populate, we might be able to get a population of the necessary size, mightn't we?

It's at this point, of course, that mutation enters evolutionary process. How large a population of chimpanzees would you have to have to produce an Einstein? The question isn't sensible, even if it is mathematically logical! (Since the Gaussian curve is a purely mathematical curve, the question has a *mathematical* answer.)

Practical evolution works on some mutations, but largely it depends on the effect of statistical runs. Many individuals that appear to be "mutants" are simply the result of statistical runs. Runs are an inherent characteristic of a true statistical process; a process that doesn't yield runs isn't a free statistical system. Suppose you flipped a coin, and got a sequence going heads, tails, heads, tails, heads, tails . . . in that order for one thousand times. It's perfectly true that a statistical analysis shows that the coin, if honest, should show fifty per cent heads and fifty per cent tails, and the above process shows exactly that, so what's wrong?

It's precisely as wrong as it would be if you pitched five hundred heads followed by five hundred successive tails. The heads-tails-heads-tails sequence shows no runs whatever; it must be a rigidly controlled system.

Genetics is a statistical process. The anciently observed proposition "Like father, like son," is as valid as the proposition that there will be a fifty-fifty distribution of heads and tails.

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Aristocracy and primogeniture has faded every time Man has tried it—because genetics is a statistical process. The clearly observable truth "Like father, like son," was the truth, and nothing but the truth . . . but not the whole truth. The result was the origin of the idea of "fairy changelings," and deep suspicion that the woman in the case was not faithful, that the son was, indeed, like his father . . . only the father wasn't the one he was thought to be.

The latter statement is the rest of the truth—but the mechanism was considerably more involved than our forefathers could figure out. When a woman mates with a man, it is, at the action-fact level, an individual-to-individual system. But genetically, her statistical lineage mates with his statistical lineage, and that is anything but individual! The true father of the son is *not* John Doe; *it is John Doe's ancestry*. Observably, the

son that results is like the *genetic father*, but not necessarily like the *individual father*.

Now if the individual father happens to be very, very close to the norm of his entire genetic ancestry, the discrepancy will be unnoticeably small. Since, by the very definition of statistical processes, this will be the *normal* situation, the normal observation will be "Like (individual) father, like son."

But now let's consider what happens when an individual comes along who is a statistical-run individual; he was lucky enough to get a chance collection of all the best available genes of both parental lines. By the very nature of the statistical process, this phenomenon *must* occur. Then the child will not resemble either the individual father nor the genetic-father (or mother) line.

We may, then, have a man and woman who are nobodies, descended from a long and undistinguished line of nobodies, giving birth to a son who is a tremendous human being—a major genius. Centuries ago he would have been called "a changeling"; obviously he didn't fit in *that* family!

So a great man arises from nowhere. From peasant stock a Francois Villon arises, to lead his people against a far inferior aristocracy. A Ghengis Khan, a terrific organizational genius, arises from wandering nomad peoples.

But each of these is doomed by the very statistical process that gave him being to ultimate frustration. He does not resemble his genetic line; he's a statistical run. And he can, in turn, be father *only to his genetic line*. He is doomed, inevitably, to see his children turn out only moderately above the norm of his genetic line. He is not a mutant, who can reproduce his altered kind; he is simply a genetic run of statistically aggregated favorable characteristics. His children will dissipate that heritage by the very nature of the statistical process.

Suppose a long line of individuals of competence level 1.00—on any arbitrary scale you choose—give rise to an individual of competence level 3.00, while at the same time, a long line of unusually competent and brilliant individuals, who have, for generations, produced children of competence 2.3, have an unfortunate

statistical-run baby of competence level 0.85.

Which is the better human being?

The bitter, repugnant fact is that the dull-normal individual of competence 0.85 has higher potential than the high-genus of competence 3.00! True, our 0.85 individual is dull, and will accomplish little by his own efforts. He'll probably get by all right; his family has money. (After generations of competence level 2.3 you can bet on that!) He'll probably marry a pretty fine woman, too; his family will see to that. He'll be miserable, personally, because he'll find that he is, all his life, "pushed around" by his family and his wife.

But the inescapable statistics of genetics will still work; his children will suffer only slightly from their father's bad statistical run—they will inherit his statistical line, not *his* genetics. Which will make his life even less happy; presently he'll be "pushed around" not only by his older relatives and his wife, but also by his children.

The favorable statistical-run individual of competence level 3.00 will be unhappy, too. He will get little understanding from his family, will start with little financial background, and will have to make his own way. He'll have trouble finding a wife who can match him, the difficulty increased by the fact that there is a "prejudice" against a man of no family. And he will find his children a great and enduring disappointment; they will not under-

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stand him, or be a credit to him. They will, of course, be like their genetic-father, not like their individual-father.

The "prejudice" against the man of no family arises, then, from a very, very ancient observation. A statistical-run individual is of immense value—as an individual. But as he sprang from a long line of undistinguished nobodies, it's a reasonable bet that his children will join that same long line.

Every outstandingly great genius of history is inevitably and inescapably faced with that problem; his genetic children will resemble his *line*, not himself. As his own parents failed to understand him, so will his children. The great heritage he builds for them during his lifetime, they will dissipate.

The outstanding genius must pass his accomplishments along by some other, nonstatistical method. His effect on posterity cannot be left to the chance-statistics of genetics; it must be preserved by the non-chance processes of the written word, and the taught methods and techniques. He can only preserve his achieve-

ments by teaching them to others at the full conscious level of understanding.

The true great genius rises above race and racism for a very simple reason. He cannot hope to maintain his heritage through genetics and race! He is forced to recognize that he cannot hold for himself or his children the achievements he has earned; he *must* share them, for only in that way can he by-pass the frustrating inexorability of the Laws of Chance.

The long-term result is quite simple. The genius who refuses to share freely the greatness that Chance has given him . . . dies without issue, no matter how many children he may have.

But the individual who shares freely in his accomplishments, without thought of race or breed or birth will implant his advances on the whole structure of Mankind. And those ideals will, inevitably, constitute an environmental pressure that will, over the years, *skew the whole curve of evolution in his own direction.*

The effect of the great geniuses is not through their own, individual genetics, but through establishing in the whole world's thinking a set of ideals that imposes a selective pressure on all individuals through the centuries to come. The cultures that arise, incorporating the ideals the genius established, will selectively and "unfairly" encourage individuals approximating those ideals. That long-continued environmental pressure will produce a selective effect favoring all individuals of the genius' own type—whatever race they may belong to!

But in any race, in any time, in all of human history, past, present, and future, so long as we remain a bisexually reproduced race, the statistical effect of the process of genetics will frustrate the outstanding genius. His genetic children can never be expected to be "Like father." Only the normal human being of his time and place can look forward to having children who understand and appreciate him.

And "race" in the usual sense of the violent "racist," has nothing whatever to do with it, of course. The statistical-run genius will appear in every group, his parental stock having nothing whatever to do with the fact of a statistical run.

And—don't blame an individual's sense of vast rejection and loneliness on "race prejudice." It's individual prejudice; the statistical-run individual belongs to no race anywhere. He will be rejected as incomprehensible by his parents, by

his neighbors, and by his children. He's the victim of a statistical run; he is what he is by no choice of his own, and certainly by no choice of his parents or neighbors. And he is quite solidly and inescapably doomed to live with the predictable certainty that he *will* "take it with him" when he dies, unless he somehow achieves a nongenetic means of communicating with those very neighbors who reject him.

Sure, it's mighty easy for a brilliant Negro to feel that all his troubles are race prejudice. Never having been a brilliant Caucasian, he can't possibly have the experience that the brilliant white is just as roundly rejected, and just as thoroughly frustrated. The brilliant Jew feels his rejection is due to anti-Semitism. The brilliant individual is rejected for being brilliant, not because he's brown, pink, yellow, red, or polka-dot. The real race-prejudice is the deep and abiding prejudice against the whole race of geniuses.

It's understandable, of course, for whatever the normal man may do, he suffers a far deeper and far more abiding frustration. He doesn't suffer the frustration of immediate rejection by neighbors, parents, and children. But at a very deep level he knows, and always has known, the everlasting and ever-repeated truth.

The seed of the geniuses shall inherit the earth. And the stars, too, of course. The normal man of any given era is rejected by the whole immensity of the Future.

THE EDITOR.

—Continued from other side

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